AIR CAMPAIGN

SINK THE *TIRPITZ* 1942–44

The RAF and Fleet Air Arm duel with Germany's mighty battleship

ANGUS KONSTAM | ILLUSTRATED BY JIM LAURIER

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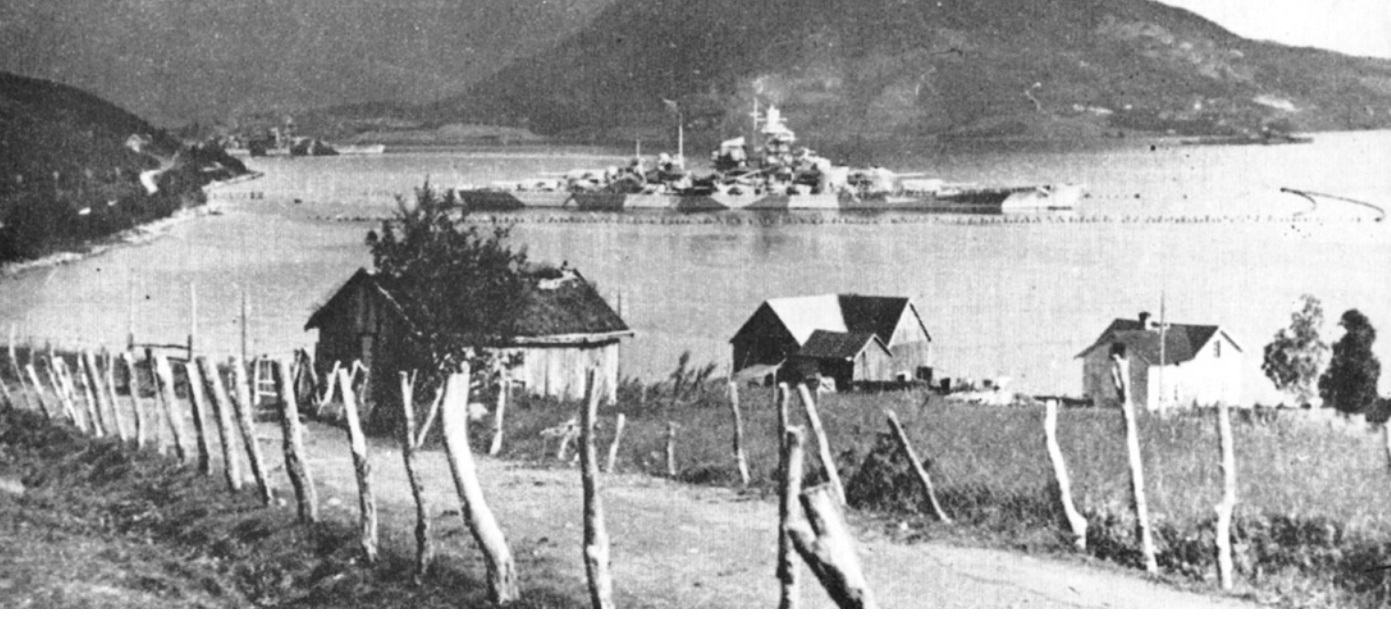


INTRODUCTION

The *Tirpitz*, photographed during her brief stay in the Bodenfjord near Narvik, during the late summer of 1942. This picturesque fjord was used as a rendezvous and repair area by the Kriegsmarine, as it lay beyond easy reach of British bombers.

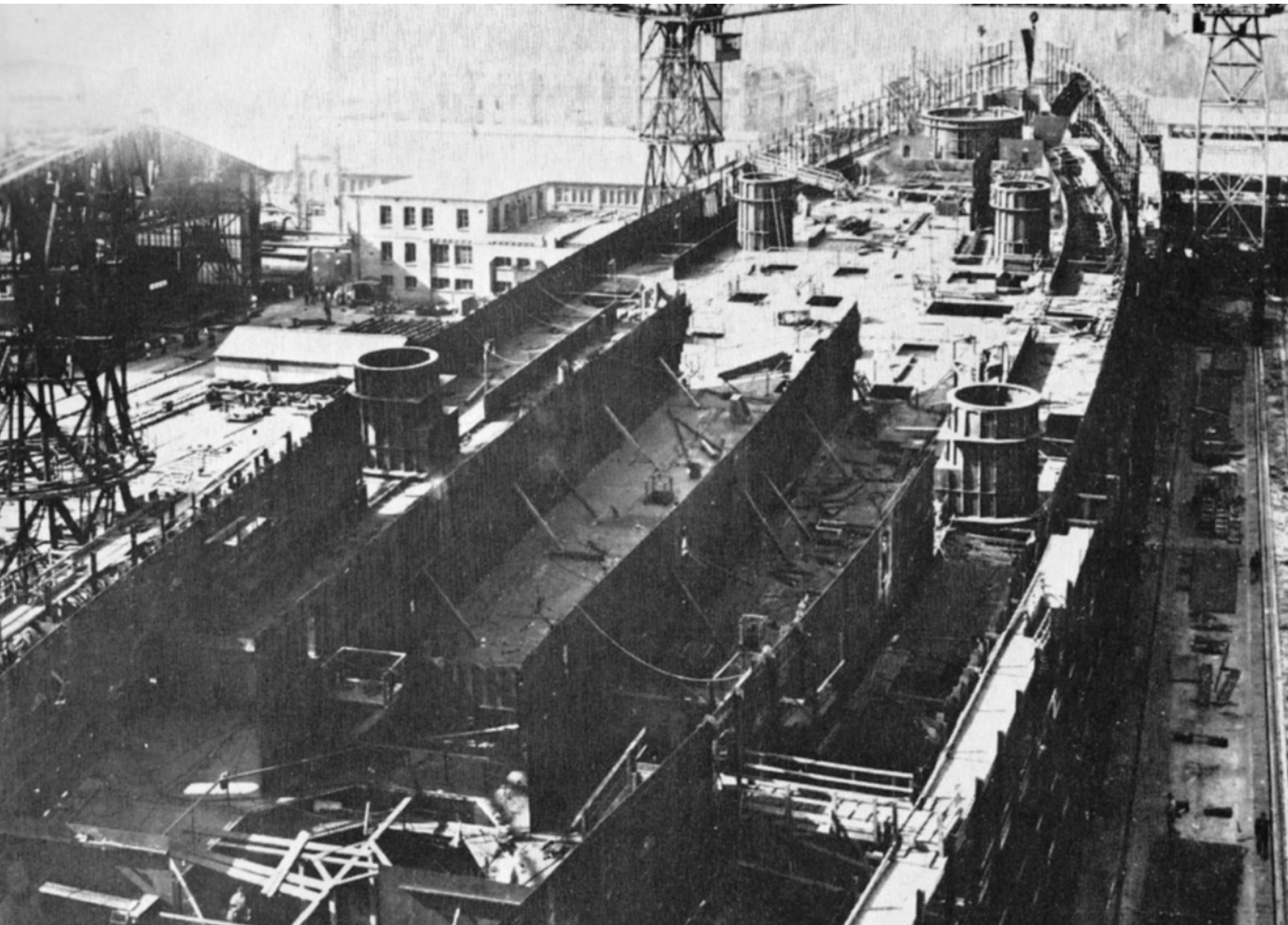
In May 1941 the world's attention focused on the German battleship *Bismarck*, and her brief but deadly sortie into the Atlantic Ocean. She was the most modern battleship afloat, and while the Nazi propaganda machine dubbed her 'unsinkable', she was eventually hunted down and destroyed by the Royal Navy. This victory, though, came at a terrible cost – the loss of the battlecruiser *Hood*, and all but three of her crew. By then, the British Admiralty were uncomfortably aware that this formidable battleship had a sister ship – the *Tirpitz*, which was undergoing sea trials in the Baltic. She was so powerful she was capable of sinking any capital ship in the British Home Fleet, and if she joined forces with other major German warships she could alter the course of the war at sea.

Air attacks against her had begun when she was still under construction, but these were both half-hearted and unsuccessful. Then, the threat she posed became more than just theoretical. This was a direct result of the German invasion of Russia in June 1941. Two months later the first Arctic Convoy arrived in Archangel. This maritime lifeline was as much a diplomatic enterprise as a military one, carrying military hardware and supplies from Britain, Canada and the United States to the Soviet Union, to help it stave off the German onslaught. When in January 1942 the *Tirpitz* sailed to Norway, she represented a major threat to this vital convoy route. So, Churchill ordered that she should be destroyed. The Royal Navy could only bring her to battle if she put to sea, so this meant she had to be attacked from the air, in her lair at the end of a remote Norwegian fjord.

The British Home Fleet was forced to retain battleships and aircraft carriers in the area to protect the Arctic Convoys from attack by *Tirpitz*, the German battleship rarely put to sea. So, this would primarily be an air campaign, where the performance of the various types of aircraft used against her would be critical to the success of the operation. Even more important was the ordnance they could use against her, and the skill of the air crews who would direct it against the battleship.

The intermittent air campaign against *Tirpitz* lasted for more than two and a half years. These desperate attacks involved hundreds of aircraft from both Bomber Command and the Fleet Air Arm, and a range of aircraft and ordnance. Attacking the *Tirpitz* in her various Norwegian lairs was never going to be easy. Planners had to contend with a number of problems, including the range to the target, the defensive capabilities of the defences surrounding *Tirpitz*, and the geography of her berth. Then there were the problems caused by the highly changeable weather over Norway, combined with huge seasonal variations in the amount of daylight. Even if all these challenges were overcome, any attacking force still had to deal with the ship herself, one of the best-protected warships in existence, and one which mounted a formidable array of anti-aircraft guns. Of all these factors, the biggest constraint was range. While *Tirpitz*'s first base in the Faettenfjord near Trondheim was within range of British heavy bombers flying from airfields in the north-east of Scotland, her second lair in the Kaafjord, a spur of the larger Altenfjord at the northernmost tip of Norway, was out of range. So, innovative solutions had to be found to overcome these problems.

It was arguably the most sustained air operation of the war, but the mighty German battleship proved remarkably resilient. So, for much of the war she remained a 'fleet in being', forcing the Allies to tie down warships which were vitally needed in other theatres. *Tirpitz* finally succumbed in November 1944, sunk by mammoth bombs dropped by 617 'Dambusters' Squadron. While her career was not as spectacular as that of her famous sister ship, it was much longer, and her impact on the course of the war was considerably greater.



This photograph, taken from the highest crane in the naval yard, shows *Tirpitz* during the early stages of her fitting out in the Kriegsmarinewerft Wilhelmshaven. Her superstructure is being erected, on top of her thick armoured deck, which was located two decks below her upper deck. The barbettes of her main and secondary gun turrets are already in place.

CHRONOLOGY

1936

2 November *Tirpitz* laid down in Wilhelmshaven.

1939

1 April *Tirpitz* launched.

3 September Britain declares war on Germany.

1940

8/9 October RAF bombers attack Wilhelmshaven. No hits on *Tirpitz*.

1941

8/9 January RAF bombers attack Wilhelmshaven. No hits on *Tirpitz*.

29/30 January RAF bombers attack Wilhelmshaven. No hits on *Tirpitz*.

25 February *Tirpitz* commissioned.

28 February/1 March RAF bombers attack Wilhelmshaven. No hits on *Tirpitz*.

6 March *Tirpitz* transits the Kaiser Wilhelm Canal to Kiel, to begin sea trials in the Baltic.

27 May *Bismarck* sunk by warships of the British Home Fleet.

28/29 May RAF bombers attack Kiel. No hits on *Tirpitz*.

20/21 June RAF bombers attack Kiel. No hits on *Tirpitz*.

22 June Operation *Barbarossa* – German invasion of the Soviet Union begins.

21–31 August Operation *Dervish* – first Arctic Convoy sails to northern Russia.

1942

15 January *Tirpitz* arrives in the Faettenfjord.

30/31 January Operation *Oiled* – RAF attack on *Tirpitz* in the Faettenfjord. No hits.

6–9 March Operation *Sportpalast* – *Tirpitz* sorties in attempt to attack Convoy PQ-12.

9 March Torpedo attack on *Tirpitz* off Lofoten Islands by aircraft from HMS *Victorious*.

30/31 March RAF attack on *Tirpitz* in the Faettenfjord. No hits.

27/28 April RAF attack on *Tirpitz* in the Faettenfjord. No hits.

28/29 April RAF attack on *Tirpitz* in the Faettenfjord. No hits.

2 July *Tirpitz* sails from Faettenfjord to the Altenfjord, during Operation *Rösselsprung*, the German operation to destroy Convoy PQ-17.

5–6 July *Tirpitz* sorties from the Altenfjord, in attempt to intercept Convoy PQ-17.

9 July *Tirpitz* arrives in the Bogenfjord, near Narvik.

24 October *Tirpitz* returns to the Faettenfjord.

30/31 October Operation *Title* – underwater attack on *Tirpitz* in the Faettenfjord using human torpedoes; aborted due to bad weather.

1943

11–13 March *Tirpitz* moves north to the Bogenfjord, to join *Scharnhorst*.

22–24 March *Tirpitz* proceeds from the Bogenfjord to the Kaafjord, at the end of the Altenfjord. This will become her new 'lair'.

22 September Operation *Source* – underwater attack on *Tirpitz* in the Kaafjord using midget submarines (X-Craft). *Tirpitz* badly damaged.

29 September *Tirpitz* commences a lengthy period of self-repair, to render her operational again.

1944

10/11 February Soviet Air Force attack on *Tirpitz* in Kaafjord. No hits.

3 April Operation *Tungsten* – naval air strike on *Tirpitz* in the Kaafjord. Battleship damaged.

24 April Operation *Planet* – naval air strike cancelled due to bad weather.

15 May Operation *Brawn* – naval air strike cancelled due to bad weather.

28 May Operation *Tiger Claw* – naval air strike cancelled due to bad weather.

17 July Operation *Mascot* – naval air strike on *Tirpitz* in the Kaafjord. No hits.

22 August Operation *Goodwood I* – naval air strike on *Tirpitz* in the Kaafjord. No hits. Followed by Operation *Goodwood II* – naval air strike on *Tirpitz* in the Kaafjord. No hits.

24 August Operation *Goodwood III* – naval air strike on *Tirpitz* in the Kaafjord. Battleship slightly damaged.

29 August Operation *Goodwood IV* – naval air strike on *Tirpitz* in the Kaafjord. No hits.

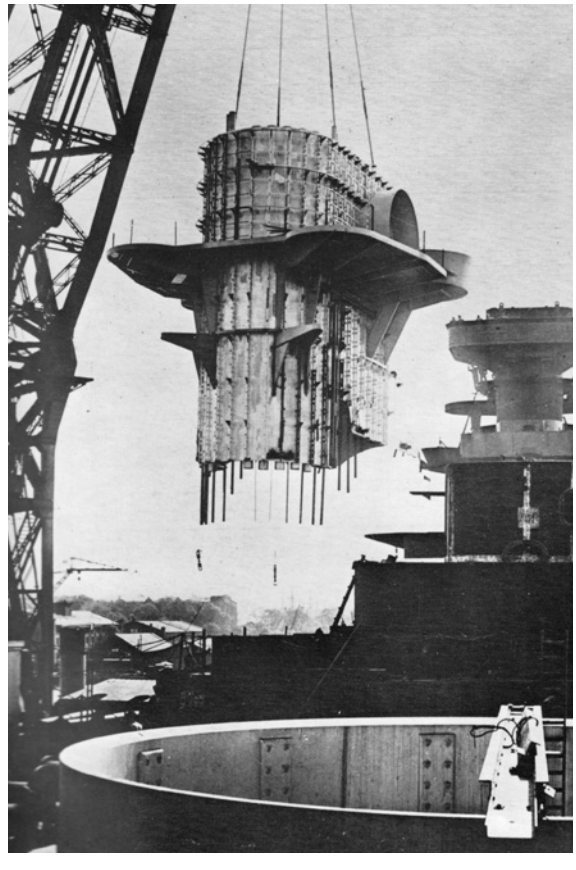
15 September Operation *Paravane* – RAF attack on *Tirpitz* in the Kaafjord. Battleship badly damaged.

15–16 October *Tirpitz* moves from Kaafjord to new moorings off Haakøy Island, near Tromsø.

29 October Operation *Obviate* – RAF attack on *Tirpitz* off Haakøy Island. Battleship slightly damaged.

12 November Operation *Catechism* – *Tirpitz* sunk off Haakøy Island near Tromsø. Up to 1,000 of her crew are killed in the attack or its aftermath.

The funnel of *Tirpitz* being lifted into place during her fitting out in the Kriegsmarinewerft (Naval Shipyard) Wilhelmshaven. The battleship's forward superstructure is already in place, while the foreground is dominated by the heavily armoured barbette ring of 'Dora' turret.



ATTACKERS' CAPABILITIES

TO SINK A BATTLESHIP

The Short Stirling was one of the three British four-engined bombers produced according to the Air Ministry's specifications. The Stirling was used in the first RAF bombing raid on the *Tirpitz* in January 1942, while she was moored in the Faettenfjord. The Stirling's major disadvantage when compared to the Halifax and the Lancaster was its low ceiling.

Aircraft of Bomber Command

From the outset Bomber Command decided to attack *Tirpitz* using four-engined heavy bombers. Smaller twin-engined bombers lacked the range. In 1942 that meant the Short Stirling, the Handley Page Halifax or the brand-new Avro Lancaster. Of these the Stirling and the Halifax were broadly similar in terms of performance. However, the Stirling had a ceiling of just 16,500ft, while the other two heavy bombers could fly at least 5,000ft higher. This made the Stirling more susceptible to enemy flak. Both the Stirling and the Halifax carried a similar-sized payload (14,000lb and 13,000lb respectively. However, to reach Trondheim from the airfield at Lossiemouth in the north-east of Scotland, the Stirling would have to reduce its payload to 12,000lb. On the same mission the Halifax could carry its full payload. So, after the initial small bombing raid on 30/31 January 1942, when a combination of Stirlings and Halifaxes were used, the Stirling squadrons were returned to other bombing duties, and the task of dealing with the *Tirpitz* fell to the crews of the Halifaxes, augmented in April by Lancasters.

The Lancaster was one of the outstanding heavy bombers of the war. Although its general performance was similar to that of the Halifax, the Lancaster enjoyed a big advantage in terms of range. Also, while both bombers had a broadly similar payload (13,000lb for the Halifax, and 14,000lb for the Lancaster), the configuration of the Lancaster's bomb bays proved far more versatile. That meant that while the Halifax could be converted to carry large bombs such as the 4,000lb 'cookie', or 'blockbuster' bomb, which was used during the spring raids on the *Tirpitz* in 1942, it was incapable of carrying larger bombs. As a result, only the Lancaster could carry the 12,000lb 'Tallboy', which was used against the *Tirpitz* with devastating effect in late 1944. Even then, to attain the range needed to reach their target, these bombers had to be lightened by removing their upper turret. That, of course, made them extremely vulnerable to German fighters.

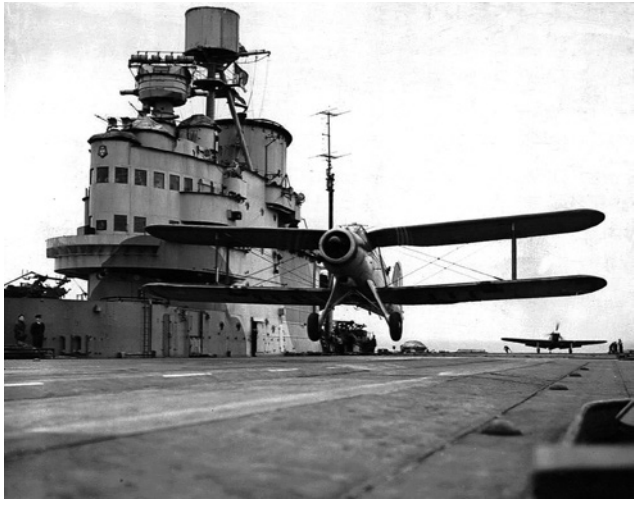
Short Stirling heavy bomber	
Entered service:	May 1940
Length:	87ft 3in (26.6m)
Wingspan:	99ft 1in (30.2m)
Weight when laden:	59,400lb (26,944kg)
Powerplant:	4× Bristol Hercules engines
Max. speed:	282mph (454kph) at 12,500ft (3,800m)
Range:	2,330 miles (3,750km) with bomb payload
Ceiling:	16,500ft (5,030m)
Armament:	2× machine guns (MG) in nose turret, 2× MG in upper turret, 4× MG in tail turret
Bomb payload:	14,000lb (6,350kg)
Crew:	7

Handley Page Halifax heavy bomber	
Entered service:	November 1940
Length:	71ft 7in (21.82m)
Wingspan:	104ft 2in (31.75m)
Weight when laden:	54,400lb (24,675kg)
Powerplant:	4× Bristol Hercules engines
Max. speed:	282mph (454kph) at 13,500ft (4,115m)
Range:	1,860 miles (3,000km) with bomb payload
Ceiling:	24,000ft (7,315m)
Armament:	1× MG in nose cupola, 4× MG in upper turret, 4× MG in rear turret
Bomb payload:	13,000lb (5,897kg)
Crew:	7

Avro Lancaster heavy bomber	
Entered service:	February 1942
Length:	69ft 4in (21.11m)
Wingspan:	102ft (31.09m)
Weight when laden:	55,000lb (24,948kg)
Powerplant:	4× Rolls Royce Merlin engines
Max. speed:	282mph (454kph) at 13,000ft (4,000m)
Range:	2,530 miles (4,073km) with bomb payload
Ceiling:	21,400ft (6,500m)
Armament:	2× MG in nose turret, 2× MG in upper turret, 4× MG in rear turret
Bomb payload:	14,000lb (6,400kg), although this could be modified to 22,000lb (10,000kg) for single heavy ordnance such as Tallboy or Grand Slam, at the expense of range and performance
Crew:	7

Aircraft of the Fleet Air Arm

Tirpitz's sister ship *Bismarck* was crippled by a single 18in torpedo hit on her vulnerable rudder. The aircraft which released it was a Fairey Swordfish, a lumbering biplane which looked obsolete, but which actually proved a highly effective aircraft. The Swordfish was designated a Torpedo/Bomber/Reconnaissance aircraft (TBR) by the Fleet Air Arm, and so had to perform three roles. This merely added to its versatility, and explained why it remained in active service throughout the war. However, the Swordfish never saw action against the *Tirpitz*. That task fell to the Fairey Albacore, another biplane that was billed as the replacement for



A Fairey Albacore taking off from the deck of an Illustrious-class fleet carrier – probably *Victorious* – while behind her a Seafire is preparing to begin her take-off run. This Albacore is unarmed, so is probably flying on a reconnaissance patrol.

the elderly Swordfish, but which was actually taken out of service before its predecessor. The Albacore (nicknamed the 'Applecore' by the Navy) proved less manoeuvrable than the Swordfish, even though it was both faster and more comfortable, having an enclosed cockpit. However, in May 1942 it was the only aircraft embarked in the carrier *Victorious* which could damage the *Tirpitz*.

During the Fleet Air Arm's attacks on the *Tirpitz* in the Kaafjord in the summer of 1944, the fleet's main strike aircraft was the Fairey Barracuda. It was designed as a replacement for the Swordfish and the Albacore, although with the exception of its speed and manoeuvrability, it was not significantly better than either of its predecessors. The Barracuda was slightly easier to fly, and its improved visibility made it better suited to carrier landings. The largest ordnance it could carry, apart from an 18in aerial torpedo, was a 1,600lb armour-piercing (AP) bomb, and it was this, together with the 500lb semi-armour-piercing (SAP) bomb and the 600lb anti-submarine bomb, that it used against the *Tirpitz*. For all this, though, it was still too slow to attack the German battleship effectively before word of its approach reached the ship and her protective smoke screen was deployed. Ultimately, it was this lack of speed which condemned the Fleet Air Arm to failure in their efforts to put *Tirpitz* out of action.

Fairey Albacore TBR	
Entered service:	March 1940
Length:	39ft 10in (12.14m)
Wingspan:	50ft (15.24m) – wings could be folded for storage
Weight when laden:	10,460lb (4,755kg)
Powerplant:	1× Bristol Taurus II engine
Max. speed:	161mph (225kph) at 1,625ft (500m)
Range:	817 miles (1,497km) with torpedo or bomb payload
Ceiling:	20,700ft (6,310m)
Armament:	1× forward-facing MG on starboard wing, 1–2× MG in rear cockpit
Bomb/torpedo payload:	2,000lb (907kg) of bombs, or 1× 18in torpedo
Crew:	3

Fairey Barracuda TBR	
Entered service:	January 1943
Length:	39ft 9in (12.12m)
Wingspan:	49ft 2in (14.99m) – wings could be folded for storage
Weight when laden:	13,200lb (6,000kg)
Powerplant:	1× Rolls Royce Merlin engine
Max. speed:	228mph (367kph) at 1,750ft (533m)
Range:	686 miles (1,104km) with torpedo or bomb payload
Ceiling:	16,600ft (5,080m)
Armament:	2× MG in rear cockpit
Bomb/torpedo payload:	1,800lb (820kg) of bombs, or 1× 18in torpedo
Crew:	3

The American-built Grumman F6F Hellcat entered service with the Fleet Air Arm in late 1942, where for a time it was known as the Grumman Gannet, to conform with British nomenclature. During Operation *Tungsten*, Hellcats operating from the escort carrier *Empress* successfully strafed and bombed the *Tirpitz* in the Kaafjord.

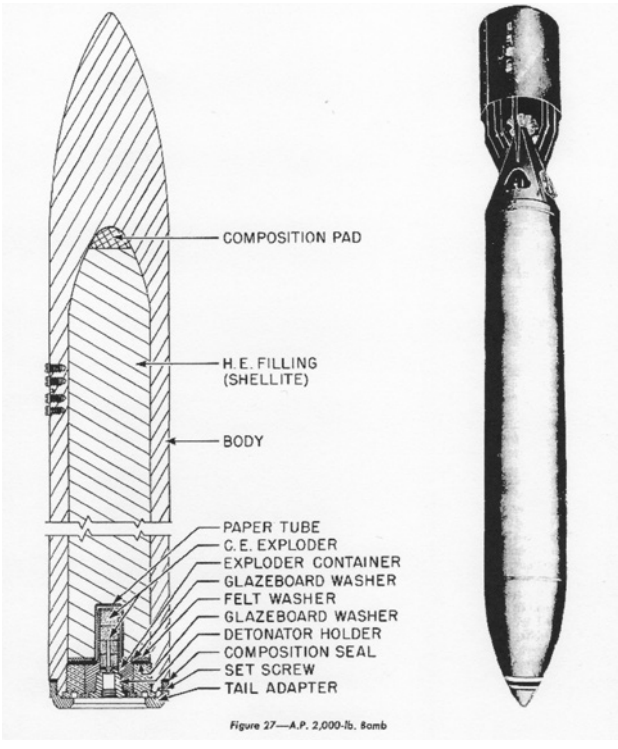
In addition to these bombers, the Fleet Air Arm used a number of fighters in their air strikes against the battleship. Of these, the American-built Grumman Hellcats and Vought Corsairs were capable of carrying small 500lb bombs, and therefore inflicting some minor damage to the battleship, if they were able to target her. Other naval fighters of British design – the Supermarine Seafire and the two-seater Fairey Firefly – were purely used as fighters, although in theory both could also carry a small bomb payload. Incidentally the Firefly also functioned as an anti-submarine aircraft, and as a reconnaissance plane. The advantage of these naval fighters over the Barracuda was their speed. The Hellcat had a top speed of 391mph, while the Corsair could manage an even more impressive 446mph. During Operation *Goodwood* this proved invaluable, as they were able to reach the *Tirpitz* before she could deploy her protective smoke screen.

The Vought F4U Corsair was another American-built fighter, which entered service with the Fleet Air Arm in November 1943. After some minor modifications it proved a robust and highly effective aircraft. During the spring and summer of 1944 Corsairs operating from the carriers *Formidable* and *Victorious* provided fighter cover for the Fleet Air Arm strikes on the *Tirpitz*.

Photographic reconnaissance

Before any operation could be planned, the attackers needed to know as much as they could about the battleship, her anchorage, and the defences around her. This information was supplied in part by Norwegian agents, but mostly it came from photographs, supplied by the Photographic Reconnaissance Unit (PRU). These flights, usually carried out by specially adapted Spitfires and later by Mosquitos, would continue for as long as the *Tirpitz* remained at large. When the battleship moved to the Kaafjord in northern Norway, the British planners had to rely on information gathered by Soviet reconnaissance planes, which lacked the specialist photographic equipment used by the PRU. However, by the summer of 1944 the PRU was able to operate from bases in northern Russia, and after an initial evaluation the photographs were flown to Britain by flying boats, where they were fully analyzed.

Between 1942 and 1944 these would provide operational planners with the basic information they needed. Not only did this



The 2,000lb armour-piercing (AP) bomb was specifically designed to be used, as its manual claimed, 'for attacks against heavily armoured targets, such as capital ships'. It was strongly built so that it didn't break up on impact, and its sleek lines and hardened nose cone encouraged it to penetrate a ship's armoured deck before exploding.

reveal exactly where the *Tirpitz* was moored, and which direction she faced; it also showed her degree of operational readiness. In addition, regular PRU sorties gathered information on shore defences, torpedo nets, patrolling guard boats, the location of escort warships and supply ships, and weather conditions. Without this information the air operations against the *Tirpitz* would have had almost no chance of success.

Ordnance

While *Tirpitz* was being built, the bombers attacking Wilhelmshaven and Kiel used 250lb and 500lb general purpose bombs, designated as medium-capacity (MC) ordnance by the RAF. These were dropped at night, from a high altitude, and so the chances of hitting the battleship were slim. Even if they did strike her they would do little damage due to her well-protected armoured deck. The best that could be hoped for was the reduction of her fighting potential through damage to sensors, fire-control equipment and flak guns. During 1944 these smaller bombs were used by the Fleet Air Arm during their attacks on *Tirpitz*. By then, semi-armour-piercing (SAP) and armour-piercing (AP) bombs were being used, but while these could pierce unarmoured decks, they were still incapable of inflicting a mortal wound.

A more powerful bomb was needed to inflict any real damage. In the port raids of 1940–41, a number of experimental 2,000lb high-capacity (HC) bombs were dropped. These were the first specialized British heavy bombs of the war. Their cast-steel cylinders were packed with Amatol explosive, and when released a drogue would deploy to stabilize the bomb as it fell. Although this type of ordnance proved ineffective in these port raids, by late 1941 a smaller but theoretically armour-piercing version was available. This was carried during the abortive January 1942 raid on *Tirpitz* in the Faettenfjord.

A larger 4,000lb HC version was developed, which had a similar cylindrical appearance, but due to its weight a drogue was omitted. The poor aerodynamic qualities of this bomb meant that its path was unpredictable once released, but by 1943 this problem was overcome by the addition of a nose cone and a circular drum fin. This allowed them to be optimistically designated AP bombs. These 4,000lb HC bombs were termed 'blockbuster' bombs by the press, as they were primarily designed to demolish urban areas. The airmen, though, nicknamed them 'cookies'. Each contained over 3,000lb of Amatol, and if an AP version hit the *Tirpitz* it was hoped that it would pierce her armoured deck and explode deep inside the ship. In practice, however, these large, thin-skinned bombs proved little more effective than conventional bombs.

The Fleet Air Arm used an American-designed 1,600lb AP bomb. Specifically designed to penetrate the deck armour of an enemy warship, it had a hardened, pointed nose and a box fin. Although theoretically capable of piercing *Tirpitz*'s armoured deck if released at a high enough point during the dive, it proved another disappointment. The effectiveness of those bombs that hit *Tirpitz* was limited, as they had been filled with only half the requisite amount of explosive thanks to defects during production. They were also plagued by a faulty detonator.

250lb MC (medium capacity) bomb	
User:	Royal Air Force, Fleet Air Arm. Introduced October 1941
Weight:	225lb (102kg). Explosive charge 63lb (28.58kg) Amatol
Fusing:	Instantaneous (contact)
Structure:	Cylindrical, with nose cone, thin casing and banded stabilizer at tail
Effect:	Conventional bomb, incapable of penetrating armoured plate
Note:	This superseded the 250lb GP (general purpose) bomb first introduced in 1926

500lb MC bomb	
User:	Royal Air Force, Fleet Air Arm. Introduced October 1941
Weight:	499lb (226kg). Explosive charge varies depending on explosive, but usually 232lb (105kg) Torpex
Fusing:	Instantaneous (contact)
Structure:	Streamlined, with thin casing and banded stabilizer at tail
Effect:	Conventional bomb, incapable of penetrating armoured plate
Note:	This superseded the 250lb GP (general purpose) bomb first introduced in 1926

500lb SAP (semi-armour-piercing) or AP (armour-piercing) bomb	
User:	Royal Air Force, Fleet Air Arm. Introduced February 1942 (SAP), March 1942 (AP)
Weight:	490lb (222kg) for SAP, 450lb (204kg) for AP. Explosive charge 90lb (41kg) TNT for SAP, 83lb (38kg) Shellite for AP
Fusing:	Delay (6 seconds) for SAP, delay (12 seconds) for AP
Structure:	Streamlined, with thickened casing (up to 1.3in/3.3cm), hardened nose cone and drum stabilizer at tail
Effect:	SAP capable of penetrating 2in (5cm) of deck armour from 2,500ft (762m). AP capable of penetrating 3.5in (8.9cm) of deck armour at 3,100ft (945m)

2,000lb HC (high capacity) Mark II bomb	
User:	Royal Air Force. Introduced December 1941
Weight:	1,723lb (782kg). Explosive charge varies depending on explosive, but usually 1,230lb (558kg) Amatol
Fusing:	Delay (12 seconds)
Structure:	Cylindrical, tapering to rear, with thin casing and rear cylinder stabilizer, although some were adapted to use conventional MC banded stabilizer at tail
Effect:	Conventional bomb, capable of wreaking considerable damage to unarmoured structures
Note:	This was essentially a precursor of the larger Blast Bombs, designed to destroy non-armoured targets. Although available from late 1941, these bombs were still being developed, and only entered service officially in June 1943

2,000lb AP Mark I bomb	
User:	Royal Air Force. Introduced October 1941
Weight:	1,934lb (877kg). Explosive charge 166lb (75.3kg) Shellite
Fusing:	Delay (11 seconds)
Structure:	Streamlined, thick-walled, with hardened nose cone and banded stabilizer at tail
Effect:	Developed specifically to use against 'heavily armoured targets' such as warships

4,000lb HC blast bomb Mark II 'cookie'	
User:	Royal Air Force. Introduced March 1941
Weight:	3,930lb (1,783kg). Explosive charge 2,882lb (1,307kg) Amatol
Fusing:	Delayed contact (12 seconds)
Structure:	Cylindrical, with thin casing and rear cylinder stabilizer in tail
Effect:	Blast bomb
Note:	These bombs were fitted with a light-gauge metal plate nose attachment to improve aerodynamic performance

On board HMS *Furious*, London-born naval armourer Bob Cotcher chalks a message on the side of a 1,600lb AP bomb slung beneath a Barracuda of 830 Squadron, shortly before the commencement of Operation *Tungsten*. The addition of graffiti to ordnance was not unknown in the Fleet Air Arm, although it was generally frowned upon in Bomber Command.

1,600lb AP Mark I bomb	
User:	Fleet Air Arm. Introduced February 1943
Weight:	1,590lb (721kg). Explosive charge 209lb (95kg) Explosive D (Dunnite)
Fusing:	Delayed contact (12 seconds)
Structure:	Conical, hardened nose cone, with stabilizing fins at tail
Effect:	Armour-piercing, designed to penetrate 5in (13.7cm) of deck armour from 4,500ft (1,370m)
Note:	Of US manufacture, first introduced in US Navy in May 1942

The Fleet Air Arm also employed the 18in Mark XII torpedo, introduced before the war, which had a range of 1,500 yards at 40 knots, and carried a warhead of 388lb of Torpex explosive. This was the torpedo which crippled the *Bismarck*, so in March 1942 it could have done the same to the *Tirpitz*. However, torpedoes were only useable if *Tirpitz* put to sea. Once the battleship took refuge in its Norwegian lairs, torpedo attacks were pointless, as the battleship was always protected by multiple barriers of anti-torpedo netting and moored in narrow fjords which lacked the space for a torpedo run to take place.

18in Mark XII torpedo	
User:	Fleet Air Arm. Introduced 1937
Weight :	1,548lb (702kg). Explosive charge 388lb (176kg) Torpex
Fusing:	Impact fuse
Power:	Burner-cycle engine
Effect:	Underwater detonation against target hull, with standard depth setting of 25ft (7.5m)
Range:	1,500 yards (1,370m) at 40 knots, 3,500 yards (3,200m) at 27 knots
Note:	Air-launched torpedo

Various types of mines were dropped during these attacks, including the Mark XIX spherical contact mine, adapted for use by the RAF. The casings of these mines were strengthened

to allow them to be dropped from the air, and their horns removed. They contained 770lb of Amatol, and in theory they should have been effective. Instead they proved another disappointment, and they were only used during the spring raids of 1942. The Fleet Air Arm tried using 600lb anti-submarine (AS) Mark VIII bombs, which effectively were air-dropped depth charges. The idea was that if they hit the *Tirpitz*, they would inflict the same damage as a 500lb AP bomb. If they missed, they would explode in the water and inflict underwater damage. They proved another disappointment. So too did the bizarre 500lb 'Johnny Walker' (JW) mine-bomb. Once dropped this 'oscillating mine' would sink to the seabed, then repeatedly rise and fall while moving laterally, until it came into contact with the underside of a ship, when it would explode. When used during Operation *Paravane* they failed to inflict any damage.

600lb AS (anti-submarine) bomb	
User:	Fleet Air Arm. Introduced March 1944
Weight:	550lb (249.48kg). Explosive charge 439lb (199.13kg) Torpex
Fusing:	Hydrostatic, with depth settings up to 260ft (79.3m), or delayed contact (8 seconds)
Structure:	Cylindrical, thin casing, with detachable nose cone and stabilizing fins at tail
Effect:	Anti-submarine bomb, operating like a depth charge, but also capable of being used as a conventional GP bomb of similar capabilities to a 500lb SAP
Note:	Nose cone designed to detach on entering water

JW ('Johnny Walker') mine Mark I	
User:	Royal Air Force. Introduced July 1944
Weight:	400lb (181.44kg). Explosive charge 90lb (40.8kg) Torpex
Fusing:	Contact fuse, and self-destruct mechanism when all compressed gas was expended
Power:	Compressed CO_2 gas system
Structure:	Cylindrical, with buoyancy chamber and parachute housing in tail
Effect:	Oscillating mine. On landing in water the mine would sink to the seabed, and a hydrostatic/timer switch would trigger the injection of compressed gas into the buoyancy chamber at 60ft (18.29m), raising the mine to the surface. The air would then be expelled, and the process would be repeated until the gas was expended
Note:	Designated 'JW' as an abbreviation for 'Johnny Walker', a reference both to the popular brand of whisky and to the appearance the mine had of 'walking' across the seabed towards its target. A parachute was attached to the tail, which was deployed when the mine was released from the aircraft. It was designed to fall away when the mine entered the water. Lateral 'walking' range was estimated at approximately 30ft (9.14m)

Spherical contact mine Mark XIX (mod)	
User:	Royal Air Force. Introduced March 1942
Weight :	1,000lb (453.6kg). Explosive charge 700lb (280kg) Amatol
Fusing:	Hydrostatic delay pistol, mechanical delay (12 seconds)
Structure:	Specially thickened spherical steel casing
Effect:	Delayed detonation on surface, or hydrostatic detonation under water at 12–18ft (3.6–5.4m)
Note:	Originally a small naval mine, introduced in 1938. Modified for RAF use by the removal of strengthening of the casing, and the removal of the mooring fittings and the eight external switch horns

Officially designated the 12,000lb Deep Penetration (DP) Bomb, Mark I, the Tallboy was so large that it could only be carried by Lancasters which had their bomb bay doors modified to accommodate them. It was filled with 5,200lb of Torpex. When released from 18,000ft from a bomber travelling at 200mph, the bomb had a strike velocity of 1,097fps.

Finally, there was the Tallboy. Designed by Barnes Wallis, the inventor of the 'bouncing bomb', this huge 12,000lb MC bomb was specifically designed to attack hardened targets. It was designated an 'earthquake bomb', as it was designed to burrow into the earth on impact, where its explosive blast would shake the earth enough to cause fortified structures to collapse. These pointed, aerodynamically shaped bombs had a thick, hardened-steel casing, were fin-stabilized and when dropped from high altitude would reach supersonic speeds on impact. They could penetrate or undermine thick concrete structures – and could do the same to the armoured deck of a battleship. Each Tallboy was filled with 5,200lb of Torpex, and it was felt that a near miss would cause almost as much damage to the *Tirpitz* as a direct hit. This was certainly the case during Operation *Catechism*, when the hits may have caused intensive internal damage to the battleship, but it was the near misses that not only caused her to capsize, but effectively dug a grave in the seabed for her.

12,000lb Tallboy (M)	
User:	Royal Air Force. Introduced June 1944
Weight:	12,000lb (5.400kg). Explosive charge 5,200lb (2,400kg) Torpex
Fusing:	Impact detonation or delayed detonation (12 seconds)
Structure:	Streamlined casing, with hardened pointed nose cone, and four stabilizing fins at tail
Effect:	Deep penetration or 'earthquake' bomb, designed to burrow beneath surface before exploding
Note:	This bomb could only be dropped from a specially converted Lancaster bomber. Its official designation was 'Bomb, HE, Aircraft, MC, 12,000lb', but Tallboy (M) was far more commonly used.

DEFENDERS' CAPABILITIES

FORTRESS IN THE FJORDS

The *Tirpitz* has often been portrayed as a lonely ship, stranded for most of the war in remote Norwegian fjords, far from the support network of shipyards, supply centres and support ships which usually attend the needs of capital ships. While this may have been true in terms of geography, she was far from lonely. For most of her time in Norway she formed part of a battle group of Kriegsmarine warships, which were in turn supported by ancillary vessels such as tankers, maintenance ships, flak vessels and numerous fishing boats, commandeered as tenders, torpedo net boats and patrol craft. She was protected by a ring of anti-aircraft defences and smoke screen equipment, while at least in the Trondheimsfjord a powerful coastal battery kept enemy warships at bay. She also benefited from a string of coastal radar stations, lookout posts and Luftwaffe airfields. Then of course, there was *Tirpitz* herself, a floating leviathan of steel and weaponry which had her own potent array of flak guns, and a highly trained crew capable of repairing almost any damage their ship might suffer.

The Faettenfjord, where the *Tirpitz* was based from January 1942 until March 1943, was just 2,560 yards long, with the narrow Vududalen valley at its eastern end, and the island of Saltøya to the west, where the fjord entered the Åsenfjord, which itself was the eastern arm of the Trondheimsfjord. *Tirpitz* was moored on its northern side, beneath the wooded hill shown here. At that point the fjord was only 300 yards wide.

The battleship

In April 1939, Frau von Hassel, the daughter of Grand Admiral Alfred von Tirpitz, broke a bottle of Riesling over the bow of Germany's latest battleship *Tirpitz*, and as Reichsführer Adolf Hitler and a huge crowd watched, *Tirpitz*'s flag-draped hull slid into the waters of Wilhelmshaven harbour. Her sister ship *Bismarck* had been launched in Hamburg two months before, and was already fitting out. When they entered service these two battleships were the most modern capital ships afloat, equipped with a powerful main armament and sophisticated fire-control equipment which made them considerably more effective than the ageing battleships of the Royal Navy. Although *Bismarck* was famously sunk on her first operational voyage in May 1941, *Tirpitz* would spend her active life in Norwegian waters. While she rarely made operational sorties, she remained a latent threat to the Allies, due to her considerable ability to wreak devastation if she ever did fall upon an Arctic Convoy.

The battleship *Tirpitz* was launched in Wilhelmshaven on 1 April 1939. The ceremony was watched by the Führer und Reichskanzler Adolf Hitler, although the launching itself was performed by Ilse von Hassel, a daughter of Grand Admiral Alfred von Tirpitz (1849–1930), the founder of the modern German Navy.

In terms of firepower her armament was conventional. Her eight 38cm guns had a range of 36,520m metres (38,280 yards) at their maximum elevation of 30 degrees – the equivalent of 19 nautical miles. They were mounted in four twin turrets – two forward and two aft – named 'Anton', 'Bruno', 'Caesar' and 'Dora', and guided by highly effective optical rangefinders. While *Tirpitz* carried a FuMo radar, she never attained the radar fire-control capability of her British counterparts. These guns were augmented by a secondary armament of 15cm guns, mounted in six twin turrets, three on each beam. In theory, by 1944 both her main and secondary guns could be used as heavy flak guns, firing high explosive (HE) rounds with timed fuses. However, her real anti-aircraft (AA) strength lay in her formidable array of flak guns.

Her 10.5cm guns, carried in eight twin mounts, had a rate of fire of around 16–18 rounds per minute, and a range of 17,700m (19,357 yards), with a ceiling of 12,500m (41,010ft). Their job was to lay down a box barrage of heavy flak, to deter enemy bombers from flying through it. Supporting them were a similar number of 3.7cm medium flak guns, with a rate of fire of 30 rounds per minute, a range of 8,500m (9,300 yards) and a ceiling of 4,800m (15,750ft) when firing tracer. Finally her 20mm light flak guns provided 'point defence' at ranges of 4,900m (5,360 yards) or less, with a rate of fire in excess of 120 rounds per minute. By early 1944 her 20mm armament had been dramatically increased by the addition of 18 quadruple 20mm flak mounts. This gave the flak batteries of *Tirpitz* a formidable level of firepower.

The battleship had an armoured belt 320mm thick which protected her hull, but which tapered below the waterline to a thinner 170mm-thick belt, designed to protect her from torpedo attack. More importantly in terms of air attack, this belt formed the sides of an armoured citadel, covered by an armoured deck designed to protect her vitals (her magazines and engine spaces) from aerial attack. It was humpbacked in shape, so it sloped towards the

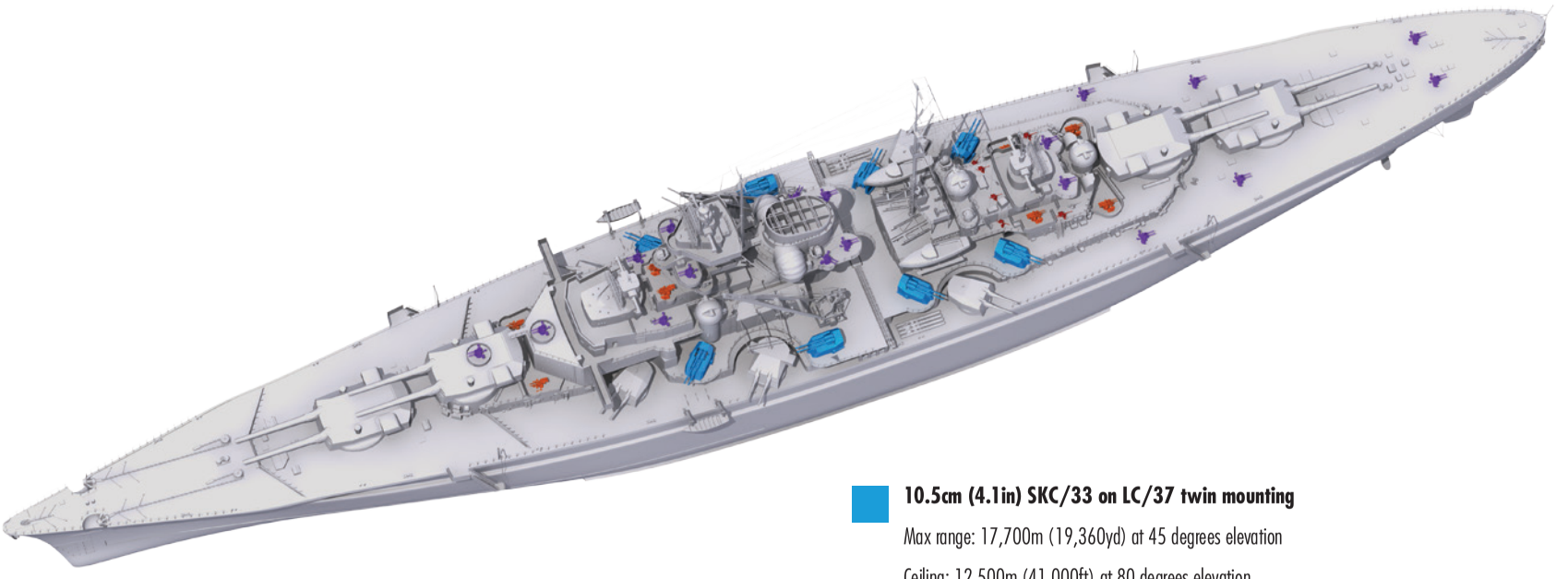
OPPOSITE *TIRPITZ'S* ANTI-AIRCRAFT ARMAMENT AND FIRE CONTROL

KMS *Tirpitz* had a conventional layout, similar to the German 'super-dreadnoughts' which entered service during the last years of World War I. The eight 38cm guns of her main battery were mounted in four twin turrets, labelled (from bow to stern) 'Anton', 'Bruno', 'Caesar' and 'Dora'. Their fire was directed by two 10.5m rangefinders, mounted on rotating domes sited in her foretop and atop her after superstructure. Secondary rangefinders, to permit the turrets to fire under local control, were also mounted in each turret.

Her secondary battery of 12 15cm guns was carried in six twin turrets, three on each beam. These were designated as either 'P' or 'S' (for port or starboard), and numbered (from bow to stern) 'I', 'II' or 'III'. They were directed by a 7m rangefinder mounted on top of the bridge. This could also serve the main gun battery if required. Similarly, a 6.5m rangefinder was mounted in each secondary turret, for firing under local control.

Her anti-aircraft defences consisted of 16 10.5cm guns, mounted in eight twin turrets, two on each beam of her forward and after superstructure. They were augmented by 16 3.7cm medium flak guns, in eight twin mounts, also grouped in a similar way, with four mounts on each beam, split between the forward and after superstructure. *Tirpitz* had four fire control stations for these heavy and medium flak guns, two on either side of the mainmast, one behind the mainmast and one behind 'Caesar' turret. Each of these contained a 4m SL-8 rangefinder. The 3.7cm flak guns were also equipped with manual sights, in case the anti-aircraft fire control system was not operational.

A large number of 20mm light flak guns were mounted around the ship, as shown in the diagram. The numbers of these increased markedly while *Tirpitz* was in Norwegian waters. These were fired using manual sights, although the quadruple mounts added in 1942–43 were linked to the SL-8 fire control system. Finally, *Tirpitz* carried a pair of quadruple torpedo mountings, fitted amidships, one on each beam.



10.5cm (4.1in) SKC/33 on LC/37 twin mounting

Max range: 17,700m (19,360yd) at 45 degrees elevation

Ceiling: 12,500m (41,000ft) at 80 degrees elevation

Rate of fire: up to 18 rounds per minute

3.7cm (1.457in) SKC/30 on LC/30 twin mounting

Max range: 8,500m (9,300yd) at 35.7 degrees elevation

Ceiling: 6,800m (22,300ft) at 85 degrees elevation

Rate of fire: up to 30 rounds per minute

2cm (0.787in) Flak 38 on L38/43 quadruple mountings or L41 single mountings

Max range: 4,800m (5,250yds) at 45 degrees elevation

Ceiling: 3,700m (12,100ft) at 90 degrees elevation

Rate of fire: up to 220 rounds per minute

sides of the ship, where it eventually joined the armoured belt. These sloped sides increased the protective capabilities of the deck. This armoured deck lay two deck levels below the actual upper deck, a steel deck clad in teak which was more lightly protected, but was still thick enough to shield the compartments beneath it from splinter damage or smaller bomb hits. The citadel did not protect the bow and the stern of the ship, which were primarily covered by her upper deck plates, although her propeller shafts were screened by a 110mm-thick armoured layer.

Taken together, the anti-aircraft batteries and her protective armour made *Tirpitz* a difficult target for Allied bombers. She had weaknesses, though. Although the armoured deck might protect her vitals, many of the ship's living spaces were situated above it, and so were vulnerable. While her main and secondary turrets were well protected, her smaller flak guns were not, and the smaller weapons lacked gun-shields to protect their crews from bomb splinters or strafing attacks. This would prove particularly problematic during Operation *Tungsten*. Her other weakness was to underwater damage, from torpedoes, mines, or the explosive power of earthquake bombs. In several attacks she suffered flooding damage, and ultimately it was this weakness which would prove her undoing.

KMS *Tirpitz* | Bismarck class battleship	
Built:	Kriegsmarinewerft, Wilhelmshaven
Laid down:	2 November 1936
Launched:	1 April 1939
Commissioned:	25 February 1941
Length:	823ft 6in (251m) overall
Beam:	118ft 1in (36m)
Draught:	30ft 6in (9.3m) standard lading
Displacement:	45,474 tonnes (50,425 tonnes fully laden, rising to 53,500 tonnes in 1944)
Propulsion:	3× Brown-Boveri geared turbines, 12× Wagner high-pressure boilers, powering three propellers, and generating 160,796 steam horsepower (shp)
Max. speed:	30 knots
Range:	8,870 nautical miles at 19 knots
Armament (1942):	8× 38cm (15in) SK/C-34 main guns in four twin turrets 12× 15cm (6in) SK/L-55 secondary guns in six twin turrets 16× 10.5cm (4.1in) SK/C-33 heavy flak guns in eight twin mounts 16× 3.7cm (1.5in) SK/C-30 medium flak guns in eight twin mounts 12× 2cm (0.8in) Flak 30 light flak guns in 12 single mounts* 8× 53.3cm (21in) torpedoes, in two quadruple mounts ** During the winter of 1943–44, this was augmented by the addition of another 78 2cm (0.8in) Flak 30 light flak guns in 18 quadruple mounts*
Aircraft:	4× Arado 196 A-3 reconnaissance float planes, 1× catapult
Sensors:	FuMo23 'radar', Gruppenhorchgerät (GHG) hydrophone system
Protection:	Belt: 320mm (13in) Turrets: 360mm (14in) Armoured deck: 100–120mm (3.9–4.7in) Upper deck: 50mm (2in)
Complement:	2,608 officers and men (1943)

The Norwegian lairs

During her time in Norway, *Tirpitz* used four anchorages. One of these in the Bogenfjord near Narvik was only a temporary sanctuary, a mustering place for Kriegsmarine naval forces, and a base used for summer training exercises or temporary repairs. It was protected by flak positions and torpedo nets, and by the booms and patrol boats which guarded the entrance to the main Ostfjord. However, this was not really *Tirpitz*'s true home. She had two of those. From January 1942 until March 1943 it was the Faettenfjord near Trondheim, and after that it became the Kaafjord, near Alten, and the northernmost tip of Norway. Then, from October 1944 until her sinking in November, *Tirpitz* was moored off the island of Haakøy, near Tromsø. This last berth proved the exception to the rule – all the others were carefully chosen so that the landscape played a major part in the battleship's defence.

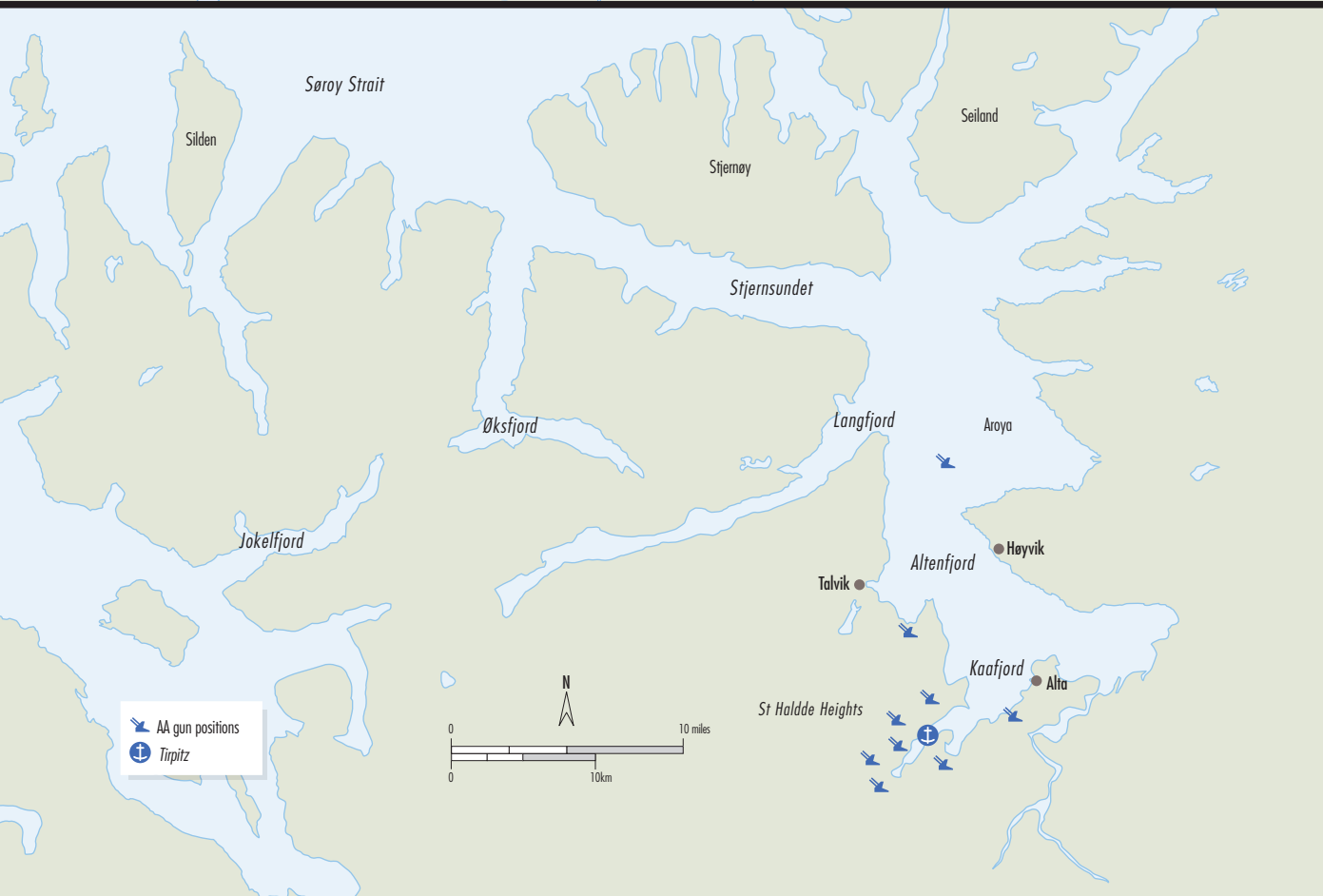
The Faettenfjord was a small spur of the Åsenfjord, 16 miles north-west of the town of Trondheim. The Åsenfjord was at the eastern end of the Trondheimsfjord, while the town itself, on its southern shore, lay another 65 miles from the open sea. The Trondheimsfjord was protected from naval incursions by coastal batteries at Hysnes and Brettingen, but the real defensive value of the Faettenfjord was that it was only 300 yards wide, and flanked to north and south by steep hills. While its western end opened out onto the Åsenfjord, the entrance was split in two by the small hilly island of Saltøya, where the *Tirpitz*'s crew established shore facilities, including sports fields and a rest camp. To the east the Faettenfjord opened into the narrow valley of Vadudalen, but the wooded slopes and steep mountains to the south made it an unattractive avenue for aviators. *Tirpitz* was moored close to the northern slope of the fjord, with her stern facing west. This facing, the narrowness of the fjord and the torpedo nets surrounding the ship rendered *Tirpitz* immune from torpedo attack. So, any attacking aircraft had to use bombs, and attack from the west. This lack of options helped the Germans immensely as they planned the local defences.

Tirpitz moored in the Faettenfjord, with her stern pointing towards Saltøya Island, which can be glimpsed in the background. She was usually surrounded by ship's boats, tugs, lighters and supply vessels, as well as rafts carrying camouflage nets. Further out, the line of buoys delineates the position of her anti-torpedo nets.

The Kaafjord was similar to the Faettenfjord, in that it was a narrow fjord, about 1,000 yards wide in the part where *Tirpitz* had her moorings. Here she lay end-on to a point of land, nestling in the curve of a small bay called Barbrudalen. In the spring of 1944, after Operation *Tungsten*, *Tirpitz* was moved to the other side of the fjord, with her stern moored to a spit of land called Straumsneset. The Kaafjord was 3½ miles long, and lay at the southern end of the larger Altenfjord. The ship herself lay 5 miles from the small town of Alta, while the open sea lay 75 miles away from the ship, at the north-western end of the winding fjord. Like the Faettenfjord, the Kaafjord was flanked by high ground, with a high ridge on the south-eastern shore of the fjord, high hills to the south, and even higher ground leading to a mountainous plateau on the north-western side. So, once again a torpedo attack was impossible, leaving attackers with the option of coming in up the fjord, or over the mountains.

Tirpitz's final lair was her least favourable. It lay next to the small island of Haakøy, and the neighbouring smaller island of Grindøy. It was 3½ miles to the west of the town of Tromsø, which lay on the far side of another island, Tromsøya. To the east and south of the anchorage was an even larger island, Kvaløya. The small stretch of water between the southern side of Haakøy and Kvaløya was known as the Sørbotn Channel. It formed part of the network of small fjords which separated Tromsø from the open sea, 32 miles away. As the largest town in northern Norway Tromsø was an important strategic asset, and *Tirpitz* was sent there to defend the port from Allied attack. However, compared with her other smaller anchorages the Haakøy one was exposed, with an open body of water on one side, and no towering mountains to shelter beneath.

Brekstad
Agdenes Fort
Hysnes Fort
Trondheimsfjord
Trondheimsfjord
Trondheimsfjord
Tautra Island
Frosta Peninsula
Åsenfjord
Fættenfjord
Trondheim
Lade
Vikkamar
Vaernes
AA gun positions
Luftwaffe airfield
Tirpitz
N
0
10 miles
0
10km


Søroy Strait
Silden
Seiland
Stjernøy
Stjernsundet
Øksfjord
Langfjord
Aroya
Jokelfjord
Høyvik
Altenfjord
Talvik
Kaafjord
Alta
St Haldde Heights
AA gun positions
Tirpitz
N
0
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10km

OPPOSITE THE FAETTENFJORD AND KAAFJORD ANCHORAGES

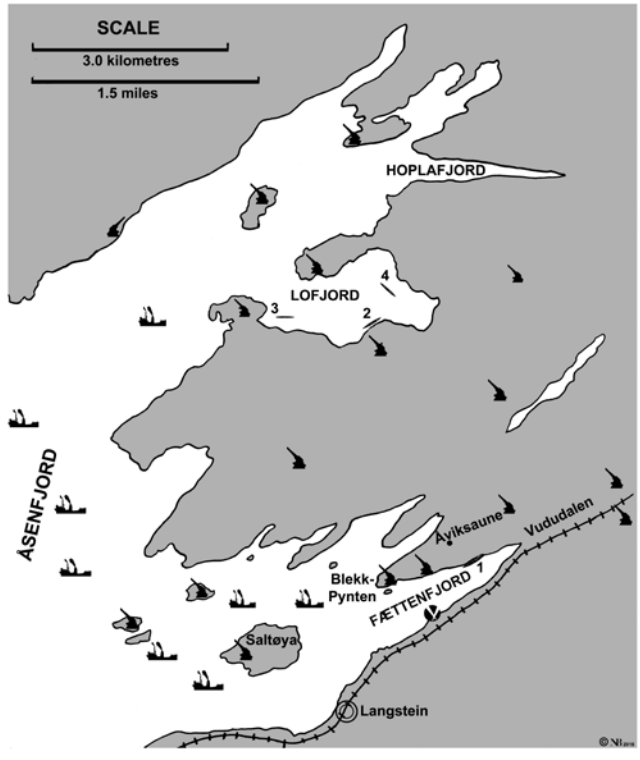
In all these cases, the real bonus of these lairs was their distance from British air bases. The Faettenfjord lay 632 miles from the forward airfields in north-east Scotland used by the Royal Air Force (RAF) in the spring raids of 1942. That was within range of British heavy bombers. The Bodenfjord was nearly 963 miles away, which theoretically was just within range of Lancasters. So too was the Haakøy anchorage near Tromsø, which was 1,049 miles away from Lossiemouth and neighbouring airfields, and so was reachable only if extra fuel tanks could be carried. At 1,146 miles, the Kaafjord lay well beyond the range of British bombers flying from Scottish airfields. That was why, in September 1944, the RAF used an airfield near Archangel in the Soviet Union for Operation *Paravane*, a mere 600 miles from the Kaafjord. These distances, though, are direct. The need to choose an approach avoiding enemy radar or airfields, and a route which gave the attackers some degree of surprise, often meant opting for a much longer flight path. So geography combined with the performance of British bombers conspired to make an attack on the *Tirpitz* a tough proposition.

The local defences

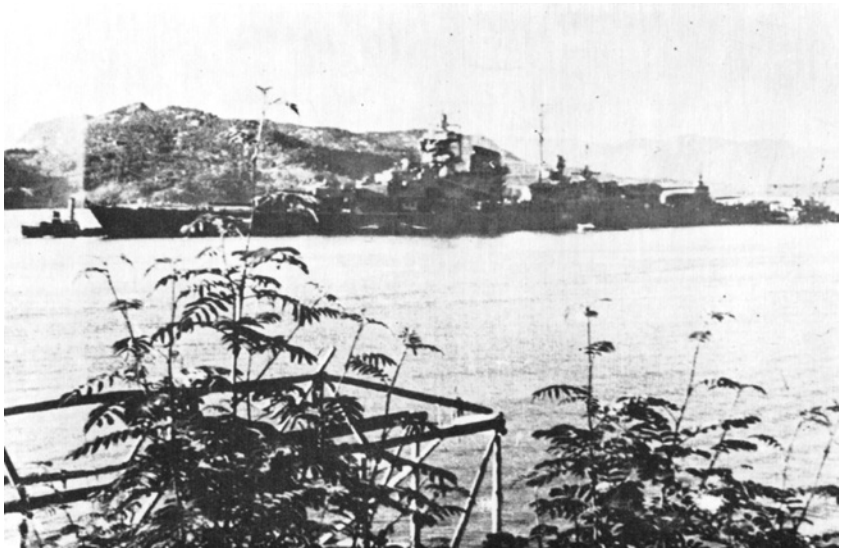
In the Faettenfjord, *Tirpitz* lay at the centre of a ring of flak defences which were there purely to protect her and other nearby warships from attack. A total of 16 flak batteries of various types and sizes were scattered over the immediate area of the fjord, and the nearby anchorage of Lofjord, used by German cruisers such as the *Admiral Hipper* and *Prinz Eugen*. These included 24 heavy flak guns of 8.8cm calibre, while six more protected Trondheim. A total of 16 lighter flak guns, of 3.7cm and 20mm calibres, made up the rest of these anti-aircraft defences, which were placed to cover both naval anchorages. Another 15 light flak guns protected Vaernes airfield, 7 miles south of the Faettenfjord.

In addition, two flak ships were moored nearby, one in the Åsenfjord and the other in the Lofjord. These were obsolete Norwegian warships captured by the Germans, and provided with an assortment of flak guns of various calibres. They would subsequently be moved to the Bodenfjord, to the Altenfjord and finally to the waters off Haakøy. Anti-aircraft fire would also come from the numerous warships in the area. This usually included a number of destroyers, but could include larger vessels, such as the battlecruiser *Scharnhorst*, the armoured cruisers *Admiral Scheer* or *Lützow*, or the heavy cruisers *Admiral Hipper* or *Prinz Eugen*.

Searchlight positions were mounted at two points on the southern shore of the Faettenfjord, while others protected Vaernes airfield and Trondheim. *Tirpitz* herself was surrounded by anti-torpedo nets, as she



The defences of the Faettenfjord, 1942–43
This shows the location of flak batteries surrounding the Faettenfjord and the nearby Lofjord, the searchlight battery facing the *Tirpitz* on the far shore of the Faettenfjord, and the various moored trawlers serving as smoke screen vessels. They were augmented by more smoke generators mounted around the shore of both anchorages. The numbers refer to the semi-permanent mooring assigned to various major Kriegsmarine warships:
1. *Tirpitz*, battleship
2. *Admiral Scheer*, armoured cruiser (or pocket battleship)
3. *Admiral Hipper*, heavy cruiser
4. *Prinz Eugen*, heavy cruiser
(Map by Nick Buxey)



Tirpitz in the Altenfjord, being guided through the channel by tugs in March 1943, on her way to her new 'lair' in the Kaafjord. The photograph was taken by Torstein Raby, a member of the Norwegian resistance movement, using a camera hidden in his suitcase.

was in all her anchorages, operated by boom defence trawlers. Further naval patrols combed the waters of the Trondheimsfjord, and a boom spanned its western end, near Brettingen battery.

However, of all the defences put in place to protect *Tirpitz*, the most effective was her smoke screen. This was provided by chemical smoke generators, which were mounted around the shore of the Faettenfjord and in parts of the Lofjord. In addition, yet more smoke generators were mounted in smoke boats – converted trawlers, eight of which were permanently stationed on the seaward side of both anchorages. In the event of an air attack these would be set off electronically, and it was reckoned that within ten minutes an impenetrable barrier of white smoke would shroud not only the *Tirpitz*, but the whole of the Faettenfjord as well.

In the Kaafjord a similar arrangement was put in place. In fact, most of the flak guns and smoke generators were simply transported up there in coastal convoys, along with their crews, stores and equipment. In the spring of 1944 there were 38 heavy flak guns in place around the fjord, supported by 22 light flak mounts, some of which were quadruple flak pieces.

Air warnings tended to come from one of the chain of radio direction finding (RDF, or 'radar') stations which covered the Norwegian coast. They could detect approaching aircraft at a range of about 50 miles, but it was only in the winter of 1943–44 that improved radar sets and a more thorough coverage made this early warning system truly effective. Similarly, the network was never fully extended so it could detect aircraft approaching from the east, where the mountainous spine of Norway and Sweden made accurate detection difficult. However, in Lapland the Germans maintained coastal radar stations which were able to provide some coverage over the flat landscape to the south. These RDF stations were augmented by lookout posts, and by observers standing watch in other key locations, such as on airfields, in towns or at military barracks. Despite a somewhat convoluted command chain, the system worked, and in most cases the captain of the *Tirpitz* was able to sound 'Action Stations' and deploy his protective smoke screen before the enemy bombers appeared.

The weak link in the German defensive screen was air cover. Luftwaffe airfields near the battleship's lairs – Vaernes near the Faettenfjord, Banak near Kaafjord and Bardufloss near Haakøy – should in theory have provided fighter cover for *Tirpitz* in the event of an air attack. These airfields were also linked in to the radar network, so intercepting an approaching bomber formation or naval air strike should have been a reasonably simple undertaking. However, intense rivalry between the Luftwaffe and the Kriegsmarine, a complicated command structure and a general reluctance to risk precious air assets meant that in virtually every case, the attacking aircraft were never intercepted. So, for instance, in the spring of 1940 there were 30 Bf 109 fighters at Vaernes and 30 Bf 110s. None of them intercepted the spring bombing raids that year. The biggest failure came in November 1944, where despite a direct phone link between *Tirpitz* and the airfield at Bardufloss, no fighters took to the air to protect the *Tirpitz* on the day of her loss.

CAMPAIGN OBJECTIVES

THE BATTLE FOR ARCTIC WATERS

A fleet in being

The *Tirpitz* was sent to Norway to join the Kriegsmarine forces there, and to form the core of a battle group which could disrupt the Allied convoys sailing to northern Russia. Norway was the ideal base for this mission, as it lay close to this convoy route, particularly in the north, where from sheltered anchorages such as the Altenfjord this battle group could easily venture deep into the Arctic Sea. The same coastline also provided a haven for U-boats, which took only two days to form a patrol line astride these convoy routes. Norway contained several air bases, and the Luftwaffe had built up their bomber strength there. So, while the Arctic Convoys could be harried from the air and from below the surface, warships such as *Tirpitz* would bide their time and choose the right moment to strike.

This, however, was only the theory. While U-boats and land-based aircraft played havoc with these convoys, surface forays were rare. The principal reason for this was the Reichsführer, who, after the loss of the *Bismarck*, was wary of committing surface ships to an action where the odds might not be completely in their favour. So, for all her immense fighting potential, *Tirpitz* spent much of the war at her moorings in the Norwegian fjords, screened by camouflage netting and torpedo nets, with her crew growing increasingly frustrated as the war was being waged elsewhere. In the two instances where *Tirpitz* did make a sortie, she failed to make contact with the enemy, except when she was attacked by British naval aircraft. This strike, carried out by Albacore torpedo bombers from HMS *Victorious*, led to two directives from Hitler. The first was that in future she would only sortie if there were no British aircraft carriers operating in the area. The second was that no offensive operation would be undertaken without Hitler's consent.

The result was the atrophy of the battleship's fighting potential. So, instead of forming a key part of a surface battle group which could sever the strategically vital convoy route between the Western Allies and the Soviet Union, she was relegated to becoming the centrepiece of the naval doctrine of a 'fleet in being'. This concept, famously proposed by the American naval strategist

In early July 1942, the German naval battle group in Norway sailed north from the Bogenfjord near Narvik to the Altenfjord, which they planned to use as a base from which to attack Convoy PQ-17. This photograph, taken from the stern of a German destroyer, shows two of these warships – the armoured cruiser *Lützow*, followed by her sister the *Admiral Scheer*. During this voyage, the *Lützow* struck an uncharted rock, and had to return to Narvik for repairs.

ARCTIC OCEAN
Bear Island
Scattering of PQ-17 1942
Battle of the Barents Sea 1942
Barents Sea
Battle of North Cape 1943
North Cape
Hammerfest
Banak
Kaafjord
Alta
Haakoy
Tromsø
Kirkenes
Petsamo
Kola Inlet
Murmansk
Bodenfjord
Bardufoss
Lofoten Islands
Narvik
Trondheim
Bodo
Norwegian Sea
Fættenfjord
Vaernes
FINLAND
NORWAY
SWEDEN
Shetland
Bergen
Oslo
Stavanger
Orkney
Scapa Flow
North Sea
DENMARK
SOVIET UNION
UK
N
0
200 miles
0
200km
Winter limits of pack ice
Front line 1942–44
Battle
Tirpitz anchorage
Arctic Convoys' winter route

Alfred Thayer Mahan (1840–1914), explained how a naval force could influence a naval war, even without leaving port. If it did so, it might lose the battle, and hence the war. However, by remaining in port it served as a 'fleet in being', forcing the enemy to continually deploy a bigger force, just in case it ever did sortie. Thus, even though she remained in the Faettenfjord or the Kaafjord, the *Tirpitz* would force the British Home Fleet to deploy precious battleships and aircraft carriers in support of the Arctic Convoys. This would then prevent these capital ships from being deployed in more active theatres, such as the Mediterranean or the Far East.

So, for Captain Topp of the *Tirpitz* and his successors, their objective was to survive, and to maintain their fighting potential. This stratagem, endorsed by Grand Admiral Raeder and then his successor Admiral Karl Dönitz, meant doing whatever was required to protect the battleship from attack, which could only come from submersibles or from aircraft. Naval defences were therefore put in place – an outer ring of search aircraft, then destroyers, followed by booms and guard vessels screening the seaward entrances to the fjords where the *Tirpitz* lay. Finally, coastal sentries, torpedo nets and lookouts would play their part. The defences against air attacks have already been described, but the problem of cooperation with the Luftwaffe was never overcome.

The naval command structure was also particularly complex. A Commanding Admiral Norway controlled all Kriegsmarine resources in Norway. The country was divided into North, South, West and Polar Coast areas, and at various times *Tirpitz* came under the control of the North and Polar commands. The commanding admiral, though, was answerable to the Chief of Naval Command in Germany, and through him to the Commander-in-Chief of the Navy, and to the Reichsführer. The Luftwaffe had its own command structure, with Luftflotte 5 based in Oslo controlling all air units in Norway, Finland and northern Russia. Under it, Fliegerführer Nord had operational control in Norway, and it in turn was divided into three regional commands. A separate structure dealt with Luftwaffe administration. What this meant for *Tirpitz* was that any request for air support had to surmount several administrative hurdles. This, combined with inter-service rivalry, meant that the *Tirpitz* and her crew were badly let down by the Luftwaffe.

Grand Admiral Erich Raeder (1876–1960) had to juggle the two strategic demands of his warships in Norway – attacking the Arctic Convoys and maintaining a 'fleet in being'. He resigned in early 1943, following Hitler's criticism of the Kriegsmarine after the battle of the Barents Sea. Here he is inspecting *Tirpitz* in the Faettenfjord anchorage, accompanied by two of his senior staff, and followed by Captain Topp.

The British goal

The British goal was simply the reverse of the German one. It needed to sink the 'fleet in being' in order to send its much-needed capital ships to other hard-pressed theatres of war. Prime Minister Winston Churchill was particularly aware of this – he understood the concept of 'a fleet in being' with much greater clarity than Hitler ever did. So, from January 1942 on, he pressed both Bomber Command and the Admiralty to deal with the *Tirpitz*. For the Admiralty, this meant maintaining the capital ship strength of the Home Fleet, so that if *Tirpitz* ever did sortie to attack a convoy, a distant covering force of two battleships was on hand to intercept it. Where possible this distant covering force was supported by an aircraft carrier, as was the case with *Victorious* in March 1942. Effectively, all the Navy could do during 1942 and 1943 was to contest control of the sea, and so help the vital convoys reach Murmansk and Archangel.

ARCTIC OCEAN
Bear Island
Barents Sea
Carrier Task Force: Tungsten, Mascot and Goodwood
North Cape
Hammerfest
Banak
Kaafjord
Alta
Haakoy
Tromsø
Kirkenes
Petsamo
Kola Inlet
Murmansk
Bardufoss
Bodenfjord
Carrier Task Force: Sportpalast
Lofoten Islands
Narvik
Trondheim
Tirpitz attacked at sea, March 1942
Bodo
Paravane
Yagodnik
Norwegian Sea
Obviate and Catechism
Fættenfjord
Vaernes
Spring 1942 raids
FINLAND
NORWAY
SWEDEN
Shetland
Bergen
Oslo
Orkney
Stavanger
Scapa Flow
Lossiemouth
North Sea
DENMARK
SOVIET UNION
UK
N
0
200 miles
0
200km
Winter limits of pack ice
Front line 1942–44
Tirpitz anchorage

OPPOSITE BOMBER ROUTES AND CARRIER LAUNCH LOCATIONS

By 1944, though, new fleet carriers had entered service, and a new breed of small escort carriers were available, to protect convoys and augment the fleet carriers for special operations. Even then, the Home Fleet had to gather all its available carrier strength in order to carry out the air offensive against the *Tirpitz* that ran intermittently throughout the spring and summer of 1944. This was a risky undertaking, as the torpedoing of HMS *Nabob* demonstrated (see page 65). Still, while the Admiralty might not agree, Churchill argued that the loss of one or two fleet carriers in exchange for the *Tirpitz* might be a price worth paying.

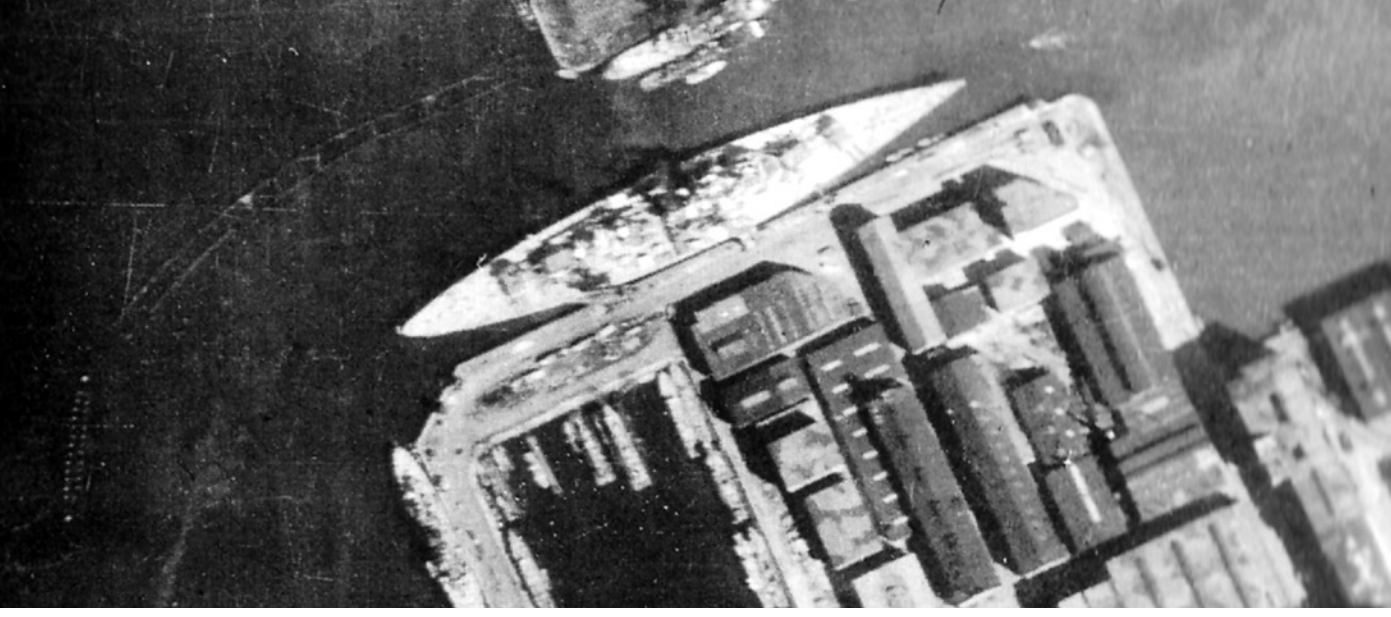
The situation was different for Bomber Command. While the bomber crews who took part in the spring raids of 1942 might not have experienced that kind of highly specialist attack before, they were at least well-versed in the business of flying bombing missions over long distances, and knew what was expected. The use of heavy bombs such as the 'cookie' gave these air crews a reasonable chance of inflicting damage on the *Tirpitz* if they could hit her, and the attacks themselves were pressed home with a grim determination. However, the lack of any serious damage inflicted during these costly raids meant that Bomber Command became reluctant to commit more of their precious bomber force on such a problematic target. Logistically, though, these missions paved the way for the RAF raids of late 1944. They demonstrated that a large bomber force could reach Norway from forward airfields in north-east Scotland, and that with the right ordnance much better results could be achieved.

The move of the *Tirpitz* to the Kaafjord placed her beyond the range of another strike of this kind, but by 1944 the ordnance to do the job had become available. The 12,000lb Tallboy bomb was almost custom-built for the task, and by 1944 Bomber Command's 5 Group had two squadrons which had already used these mammoth bombs, and their aircraft were equipped to carry them. Operation *Paravane* in September 1944 was the result of extensive planning by the staff of 5 Group, who not only oversaw the modification of the Lancasters to reach a forward base in northern Russia, and planned this epic flight across northern Europe, but also masterminded the raid which followed. The real stars of the operation, though, were the men of 9 and 617 Squadrons, led by Wing Commander 'Willy' Tait. They demonstrated the effectiveness of the Tallboy, causing the damage which would bring the battleship within range of the same bombers, this time flying from British airfields.

The planning of all these air operations, from the spring of 1942 on, had been meticulous. Large relief models of the target areas had been produced by both the RAF and the Royal Navy, and these helped the pilots understand the target area. This was important, as the geography of the Faettenfjord and Kaafjord played a major part in the operation. This was less true of the final attacks on the *Tirpitz* as she lay off Tromsø. What was needed there was the ability to fly further than a British bomber force had flown before on a mission of this kind, and clear skies when it reached the target. The first hurdle was overcome by good planning and ingenuity. The second relied on luck.

The first mission, Operation *Obviate*, was thwarted by a sudden change of weather which no meteorologist could have predicted. The second, Operation *Catechism*, took place in near-perfect flying conditions, and as a result, *Tirpitz* was destroyed. The Allies had finally achieved their objective, after what was one of the longest air campaigns of the war. By then, however, the *Tirpitz* had ceased to be a viable 'fleet in being'. This dénouement, then, was more about 'payback' than strategy.

In March 1943 Admiral Otto Schniewind (1887–1964) became the commander of the Marinegruppen-kommandos Nord (Marine Group Command North), responsible for all Kriegsmarine warships in Norwegian waters, as well as in the Baltic and the North Sea. His attempts to use *Tirpitz* more aggressively were thwarted by Hitler.



THE CAMPAIGN

TARGETING *TIRPITZ*

The *Tirpitz*, pictured in Kiel by a British PRU flight in September 1941 as she lies alongside the quay, at the entrance to the naval shipyard's inner basin. She was based there intermittently during her sea trials and 'working up' exercises, where she attracted the attention of RAF bombers.

Background

On 9 April 1940, German troops began landing in Norway. In the Trondheimfjord, the heavy cruiser *Admiral Hipper* shelled the coastal defences, and by the end of the day Trondheim was in German hands. The same was true of Narvik, Bergen, Stavanger and Oslo. Although the fighting would continue until early June, the outcome was never really in doubt. Norway fell and became an occupied country. However, the cost had been high. The Kriegsmarine had played its part in the operation, but of the 22 destroyers, cruisers and battlecruisers involved, three cruisers and ten destroyers had been lost, and two battlecruisers damaged. Grand Admiral Raeder said that having Norway was worth the loss of half of his battle fleet, as it gave his fleet a base outside the confined waters of the North Sea.

This would become of crucial importance following the German invasion of the Soviet Union in June 1941. For the moment though Norway remained relatively unimportant, as German naval efforts were concentrated on the development of naval bases on the French Atlantic coast and the launching of commerce raids into the North Atlantic. During this phase of the war the *Tirpitz* was still being fitted out in Wilhelmshaven. After that she was undergoing her sea trials. So, she missed out on Operation *Berlin*, the first of the Kriegsmarine's surface operations in the North Atlantic, which took place in early 1941. This successful sortie by the battlecruisers *Scharnhorst* and *Gneisenau* was followed in May 1941 by Operation *Rheinübung*, an operation involving *Tirpitz*'s sister ship *Bismarck* and the heavy cruiser *Prinz Eugen*.

On 27 May *Bismarck* was cornered and sunk by warships of the British Home Fleet. For the crew of *Tirpitz*, the only consolation was that the armoured citadel of their sister ship was proof against the British shells, although her superstructure and turrets were comprehensively damaged and she became little more than a floating wreck. The German crew had actually begun to scuttle their own ship to prevent her falling into enemy hands, when she was struck by torpedoes launched from a British cruiser. One or more of them hastened the end of the

battleship by demolishing her stern. The sinking of her sister ship meant that *Tirpitz* was now the Kriegsmarine's only fully fledged battleship.

The bombing raids against her began in the summer of 1940, just after the Fall of France, while she was still being fitted out in Wilhelmshaven. Most of these raids, though, were aimed at the port itself rather than the ship, and she emerged unscathed. In early March 1941 she passed through the Kaiser Wilhelm Canal to Kiel, which would serve as her base while she conducted sea trials. PRU flights monitored her progress, and a small raid using twin-engine Whitley bombers was launched against her, but this was thwarted by bad weather. She also emerged unscathed from a larger raid in June. Any further chance to damage *Tirpitz* in Kiel evaporated when the battleship finally set off to war.

The invasion of the Soviet Union in June 1941 changed the whole strategic picture in Europe. The Western Allies were put under intense diplomatic pressure to help the Soviet Union. So, in August, as German tanks drove on Moscow, a small convoy was despatched. The Dervish Convoy consisted of six merchant ships, which assembled in Iceland before heading east to Archangel in northern Russia, which it reached on 31 August. Dervish was the ad hoc forerunner of the Arctic Convoys, a maritime lifeline between Britain and the Soviet Union which was of the utmost strategic importance. A total of 78 Arctic Convoys would make the dangerous journey to northern Russia and back, battling the elements as much as the Germans. By necessity, this convoy route ran close to the Norwegian coast. From August on, therefore, Norway was once more an area of considerable strategic importance.

By the start of January 1942 *Tirpitz* had completed her crew training, and was ready for active service. On 13 January the ship transited the Kiel Canal and emerged from its western end that evening. Signals claiming she was returning to Wilhelmshaven were merely a ruse. Instead she took on fuel, stores and replacement equipment, and headed north. The British were unaware of this activity until the morning of 17 January, and so they lost track of the German battleship. By then the *Tirpitz* had arrived at her new berth near Trondheim. It was not until 23 January that she was spotted by a PRU flight. *Tirpitz* was 16 miles north-west of Trondheim, moored in the Faettenfjord. It was a near-perfect spot. The small finger-shaped fjord was just 300 yards wide where the *Tirpitz* was moored, with high ground on two sides. Attacking her there was going to be extremely difficult.

Captain Karl Topp (1895–1981) commanded the *Tirpitz* for two years, from her commissioning in February 1941 until February 1943, when he was promoted, and given an administrative command in Berlin. Known affectionately as 'Charlie' by his crew, he was regarded as one of the finest seamen in the Kriegsmarine, and one of its most competent captains.

Operation *Oiled*

Prime Minister Winston Churchill considered the bombing of the *Tirpitz* of major importance, writing that 'No other target is comparable to it.' The Fleet Air Arm quickly ruled out the feasibility of an attack using torpedoes, while its dive bombers were too small to carry a decent payload. So it was up to Bomber Command. It was decided to carry out a night attack at the end of the month, when there was sufficient moonlight to see the target. This mission would be codenamed Operation *Oiled*. On 28 January, 27 heavy bombers set off for RAF Lossiemouth,

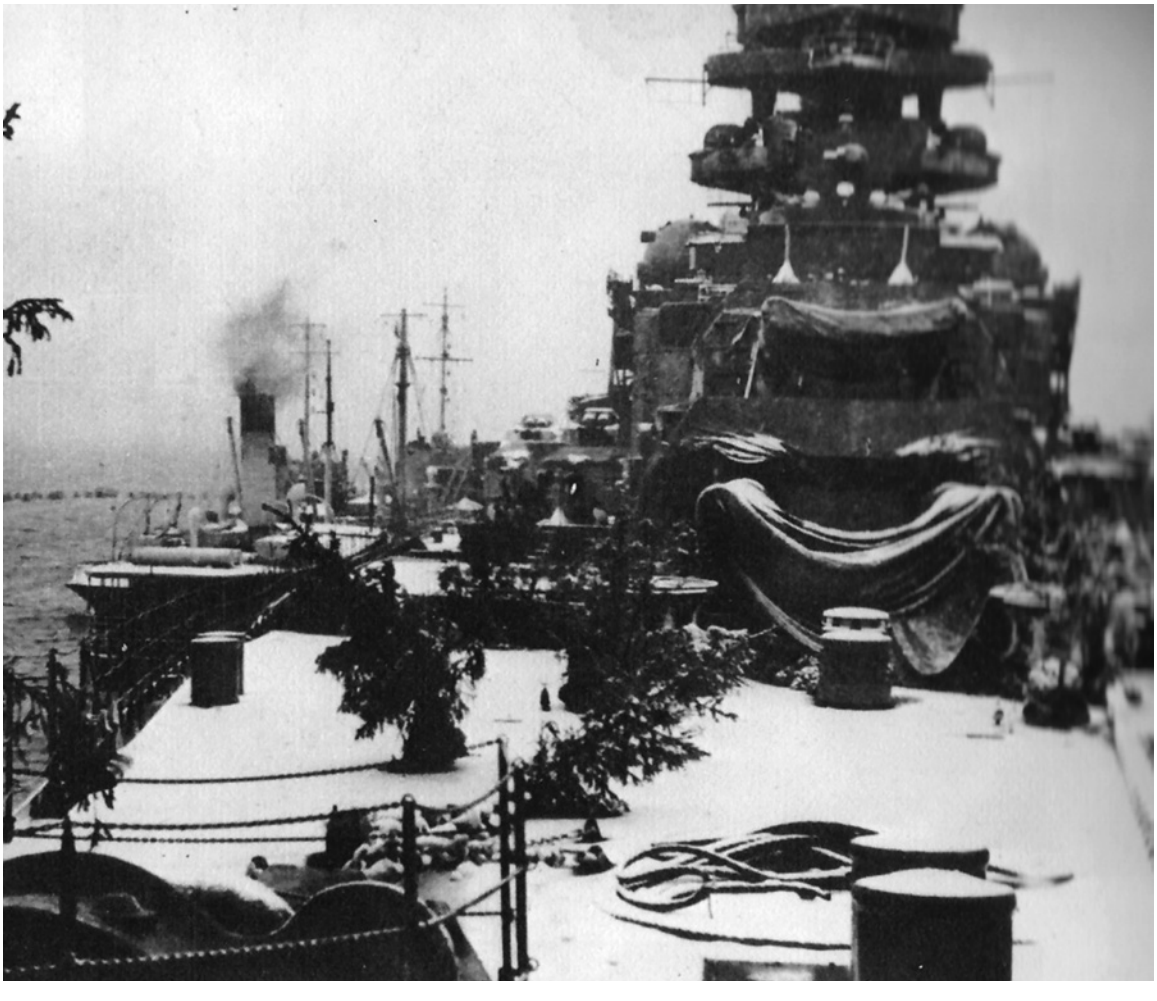
an air base in the north-east of Scotland. These comprised 16 Stirlings from 15 and 149 Squadrons, and 11 Halifaxes from 10 and 76 Squadrons.

The trip north was eventful – one Stirling was forced down by 'friendly fire' from a coastal convoy, and another crashed on landing. Then, on 30 January, 16 bombers took off from Lossiemouth, bound for the Faettenfjord. Of these, seven were Stirlings and nine were Halifaxes. Maintenance or engine problems had accounted for a third of the bomber force before the raid began.

It was a little over 600 miles to the target, and the aircraft would take three-and-a-half hours to reach the fjord. They were expected to reach the target area around 0600hrs on 31 January. If they couldn't identify the target they had no fuel reserves to linger in the area, hoping for a gap in the clouds.

The bombers carried a mixture of 2,000lb HC and AP ordnance, and 500lb SAP bombs. Each Stirling carried six of the larger bombs, while the Halifaxes were loaded with a mixture of the two. During the flight, all four Halifaxes of 4 Squadron turned back due to lack of fuel. When the remainder reached the Trondheimsfjord they found that low cloud at 1,500ft obscured the target. As the 2,000lb AP bombs had to be released at 8,000ft, it proved impossible to bomb the target with any accuracy. Only one bomber actually dropped its payload, after aiming at the epicentre of flak rising up through the clouds.

Tirpitz in the Faettenfjord in January 1942, with tugs and other support craft in attendance. Tarpaulins obscure the shape of her forward guns, while the crew have set small fir trees around her forecastle, to augment her rudimentary camouflage.



Shortly before 0600hrs the Germans spotted six bombers flying over the Trondheimsfjord, but after that they saw nothing else. However, they heard the planes, and the flak batteries opened up on them, firing blindly into the cloud. None were hit, and the frustrated bomber crews set a course for home. One Halifax crashed on the return leg, and another crashed on landing, as if to underline the futility of the mission.

The mission might have been a failure, but it highlighted a problem. The mission had failed due to poor meteorological information on the target area. In future, Bomber Command would try to liaise with the Norwegian resistance to obtain better local information before sending their bombers to the target. One hare-brained scheme, of sending Beaufort light bombers of 217 Squadron in a one-way 'suicide mission', was suggested, then quietly dropped. Meanwhile, the PRU flights would continue, and Bomber Command waited for another suitable opportunity.

Operation *Sportpalast*

At first the *Tirpitz* seemed intent to stay in her lair, as camouflage nets were rigged, and fir trees were cut and tied to the forecastle, to add to the effect. Then, on 17 February, *Tirpitz* removed her camouflage, raised steam and moved out into the Trondheimsfjord, to conduct gunnery exercises. On 23 February the armoured cruiser *Admiral Scheer* and the heavy cruiser *Prinz Eugen* appeared off the Trondheimsfjord, escorted by destroyers of the 5th Destroyer Flotilla. The Kriegsmarine was assembling a major surface battle group, centred on the *Tirpitz*, which now flew the flag of Vice Admiral Otto Ciliax.

Not everything was going the German way – *Prinz Eugen* was torpedoed by the British submarine *Triton* as she entered the fjord, and was damaged sufficiently to necessitate a return to Germany for repairs. However, that still left Ciliax with a powerful force. His biggest worry, though, was fuel. Essentially, he didn't have enough oil to undertake a full-scale sortie. So, when reports reached him that another Arctic Convoy was at sea, Ciliax decided to sail without the *Admiral Scheer*.

At noon on 6 March *Tirpitz* and three destroyers left the Trondheimsfjord, and headed north. Ciliax knew that Convoy PQ-12 was on its way to Murmansk, and a return convoy, QP-8, was heading to Britain. He expected Admiral Tovey's Home Fleet to be at sea to cover the two convoys, but he had no clear idea what its strength was, or where it might be.

Ciliax planned to intercept the convoys somewhere between Jan Mayen Island and Bear Island. PQ-12 was being tracked by German reconnaissance planes, heading north-east past Jan Mayen Island, so Ciliax put himself across its path. He hoped to encounter QP-8 too, but although Arado spotter planes were sent up from *Tirpitz* the Allied convoy was hidden by thick fog. The same fog also hindered the Luftwaffe, who lost contact with PQ-12. Ciliax was operating in the dark. So too

In 1941, Vice Admiral Otto Ciliax (1891–1964) became the Kriegsmarine's Befehlshaber der Schlachtschiffe (Commander, Battleships), and in February 1942 he led the 'Channel Dash'. The following month he embarked in *Tirpitz*, and she served as his flagship during Operation *Sportpalast*. He later became the commander-in-chief of all naval forces in Norway.

On the morning of 9 March, *Tirpitz* and an accompanying destroyer were spotted off the Lofoten Islands by search aircraft operating from the fleet carrier *Victorious*. Here the wing of the reconnaissance Albacore can be seen, as the pilot dips the wings to allow the observer to take a clear photograph of the enemy battleship.

was Admiral Tovey. He now knew *Tirpitz* was at sea, and with a force of two battleships, a battlecruiser and the aircraft carrier *Victorious* he had the power to sink her if she could be brought to battle. However, he had to find her first. By 1600hrs on 7 March, *Tirpitz* was roughly between PQ-12 and the Home Fleet, with the convoy 60 miles to the east of her, and the Home Fleet 80 miles to the west.

It was a frustrating time for both commanders. At 1600hrs that afternoon, the German destroyer *Friedrich Ihn* came upon the Russian freighter *Izhora*, a straggler from QP-8. She was sunk by gunfire. That, though, told Ciliax that he had missed the homebound convoy. So at 1045hrs on 8 March he decided to spend the day cruising towards the west, in an attempt to catch up with QP-8. *Tirpitz* cruised on her own, as the previous evening Ciliax had ordered his destroyers to put into Narvik to refuel. Finally, at 2025hrs that evening he turned southwards and headed home towards Trondheim. Tovey learned of this through Ultra signal intercepts, and he realized that his only chance of intercepting *Tirpitz* now was by crippling her in an air strike. That would allow the Home Fleet to overhaul her. Interestingly, it was a similar situation to that which had faced him the previous year, when he was pursuing *Bismarck*. It was now up to the air crews of HMS *Victorious*.

Throughout that night (8/9 March), Ciliax and Tovey headed south and south-west respectively, with the British hoping to be in a position to launch an air strike against *Tirpitz* shortly after dawn. By that time she would be to the west of the Lofoten Islands, where Ciliax planned to rendezvous with his destroyers. Also, if necessary *Tirpitz* could put in to Narvik. *Victorious* had 18 Albacores embarked, from 817 and 832 Squadrons. The intention was to fly off six of these at dawn to search for the German battleship, while the remaining 12 would form the strike force, led by Lieutenant Commander Lucas, commander of 832 Squadron. The weather had improved slightly during the night, and the fog lifted. Visibility was now good, and the cloud base was 4,000ft.

At 0640hrs on 9 March, the search aircraft were flown off, fanning out to the south-east, flying at just below the level of the clouds. Just over 50 minutes later, at 0732hrs, the strike force was flown off too. This was a gamble – if the *Tirpitz* remained undetected, then all the aircraft would eventually have to return and refuel, which meant it would be almost noon before another strike could be launched. However, at 0803hrs, *Tirpitz* was spotted west of the Lofoten Islands, heading south, escorted by the newly refuelled *Friedrich Ihn*. Soon three of the search aircraft were shadowing the battleship. They were spotted by the Germans at 0810hrs, and just over 20 minutes later *Tirpitz* flew off one of her Arado spotter planes, to act as her own scout. The Arado attacked one of the shadowing Albacores, but was hit itself. Leaking fuel, the Arado made off towards Bødo airfield, 75 miles to the south-east, as the *Tirpitz* wasn't prepared to stop to recover the aircraft.

At 0805hrs the sighting report was passed to Lucas, and he adjusted his course to intercept. Meanwhile Ciliax realized that a carrier was close by, and that a naval air strike was likely. So, he altered course towards the east, heading for the Moskenes Strait, between the Lofoten Islands and the Norwegian mainland. This was the entrance to the Vestfjorden, which led to Narvik. He also notified the Luftwaffe airfield at Bødo, requesting air cover. While records show that this message was received, cooperation between the Luftwaffe and the Kriegsmarine was poor, and the request was bogged down in official channels. Even though a squadron of modern Fw 190 fighters was just ten minutes' flying time away, *Tirpitz* and her attendant destroyer were left to fend for themselves.

Then, at 0842hrs, Lucas spotted the *Tirpitz*. She was 20 miles to the south-west, steaming east at high speed. At the time the strike aircraft had been flying at 500ft, below the level of German coastal radar, but on spotting the *Tirpitz* Lucas ordered his aircraft to climb into the clouds, so they could approach without being seen. However, a fully laden Albacore had a top speed of just 130 knots, and Lucas' planes were flying into the face of a 35-knot wind, blowing from the east, so it would be at least 30 minutes before the aircraft would be in a position to begin their attack. The 12 Albacores were divided into four sub-flights, each of three aircraft. Effectively Lucas led the strike, as its commander overall as well as of the two sub-flights of his own 832 Squadron. Lieutenant Commander Sugden commanding 817 Squadron officially commanded the planes of his own squadron, and one from 832 Squadron. However, during the attack the four sub-flights became intermingled, and Lucas directly commanded a sub-flight from each squadron (1/832 Squadron and 2/817 Squadron), while Sugden led the remaining two sub-flights. (1/817 Squadron and 2/832 Squadron)

Operation *Sportpalast*, 9 March 1942

On 6 March 1942, *Tirpitz* sailed from the Trondheimsfjord in an attempt to intercept and destroy Convoy PQ-12. Codenamed Operation *Sportpalast*, this sortie was well planned, but it was dogged by bad weather, and the convoy eluded the battleship. Eventually Vice Admiral Ciliax ordered her to return to port. Then, early on the morning of 9 March, search aircraft from the British carrier *Victorious* spotted the battleship and an escorting destroyer to the west of the Lofoten Islands. A naval air strike was launched, made up of 12 Albacore torpedo bombers. They sighted *Tirpitz* at 0842hrs, and their strike leader divided his force into two groups, so it could attack the battleship from two sides at once.

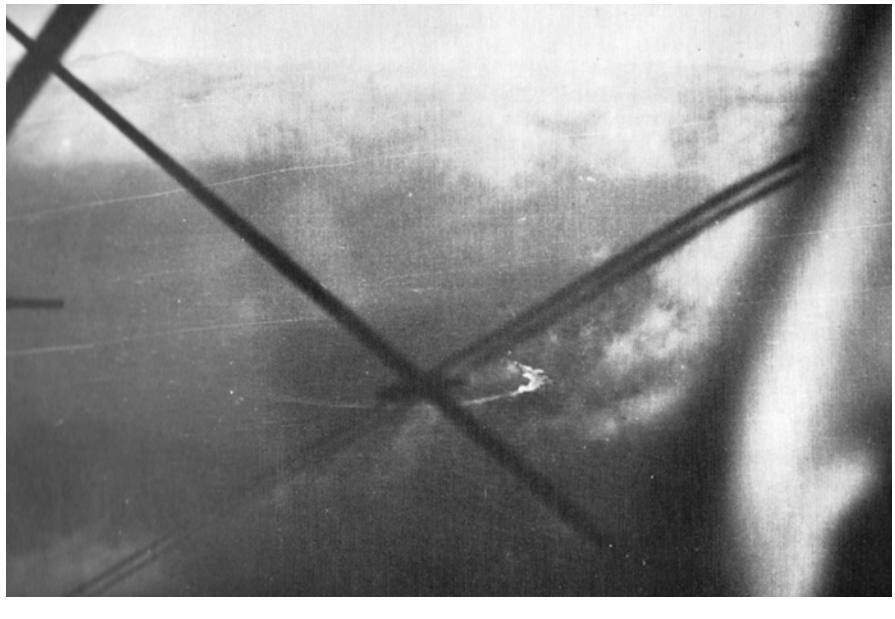
The first wave attacked from port at 0920hrs, but all six torpedoes missed. It was now up to the six Albacores who were manoeuvring to attack the battleship from her starboard side. They began their approach, but were hampered by the slow speed of their biplanes and a strong headwind. Eventually, however, they reached their attack positions about 2,000 yards off the starboard beam of the battleship, and dropped to 100ft to begin their torpedo run. The German flak was intense, coming both from the *Tirpitz* and the destroyer *Friedrich Ihn*. The Albacores dropped their torpedoes at 0925hrs, then began banking away to the south. However, two were hit before they released their torpedoes. This captures the moment when Lieutenant Commander Sugden's sub-flight of 817 Squadron launched its attack. Albacores 5B and 5L have launched their 18in torpedoes, but in the foreground 5C has been hit, and is about to crash into the sea. All the torpedoes missed, largely because the battleship began turning as the airmen made their attack. Six naval airmen were lost in the abortive strike.

Jim Laurier

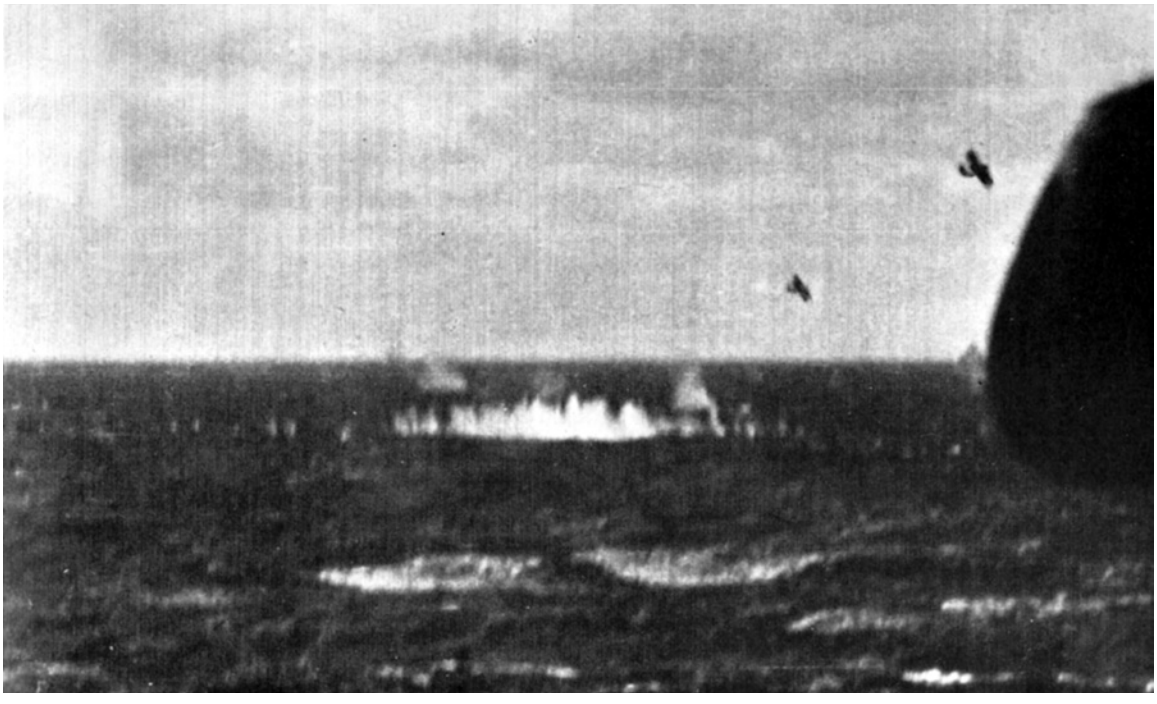
Lucas then gave the order that all sub-flights would make individual attacks, rather than attacking together. This reflected contemporary Fleet Air Arm tactics. According to the textbook, the ideal attack involved getting about a mile-and-a-half ahead of the ship, then peeling off to port or starboard before beginning the attack run. The idea was for half of the strike to attack the target from port, and the rest to starboard. The torpedo planes would drop down to 200ft while they manoeuvred, but during the attack run they would descend to between 50 and 100ft before releasing their torpedoes. Each Albacore carried a single 18in torpedo. This could run at 40 knots for 1,500 yards, and its warhead of 388lb of explosives detonated on impact. From 1,500 yards this would therefore take about 68 seconds to reach its target. As it was moving too, then the Albacore had to 'lead' the target, so that both it and the torpedo reached the same spot at the same time. In the case of *Tirpitz*, steaming at 28 knots, this meant launching a torpedo at a point 1,400 yards ahead of the ship.

The textbook called for the launch of torpedoes at a range of 1,000 yards from the target. However, the compilers of the textbook weren't being shot at while making their frustratingly slow approach, and while the air crews of *Victorious* were fairly experienced, it took more than training to press home a perfect torpedo attack in a lumbering biplane. The further a torpedo dropped from its target, the longer it took to reach it, and the further the aiming point had to be from the ship. A longer run made it more likely that the crew of the target ship could react by turning away from the oncoming torpedoes, thus 'combing' their tracks.

At 0917hrs, the strike aircraft broke through the cloud cover and began their attack. At that point *Tirpitz* was ahead of them, steaming at full speed in the same direction. As the strike force split into its four sub-flights, two edged forward towards the port beam of the battleship, and two to starboard. It was Lucas who launched the attack. By 0920hrs his 1st sub-flight of 832 Squadron aircraft (4A, 4B and 4C) were a mile away from the battleship, on her port beam. The flak was heavy, but it could have been worse, as the gunners divided their fire among the four groups of aircraft. On Lucas' order his sub-flight turned to starboard, and at 30 seconds past 0920hrs they launched their torpedoes. The range was a little under 1,500 yards. On the bridge of *Tirpitz*, Captain Topp saw the launch and immediately ordered his ship to turn hard to port. While that meant heading towards the three oncoming torpedoes, it also meant that it turned the ship away from the six Albacores gathering off his starboard beam.



In this photograph, taken from an Albacore of the second wave, which is still manoeuvring into position, the *Tirpitz* can be seen turning hard to port, to avoid the torpedoes launched at her from the low-flying aircraft of the first wave.



A pair of Albacores – 5L and 5B from 817 Squadron – try to bank and climb after releasing their torpedoes at the *Tirpitz*. The photograph was taken from Albacore 4R of 832 Squadron, which was 500 yards to starboard of the pair when they launched their torpedoes. All three aircraft made it back to *Victorious*.

The three torpedoes passed astern of the battleship. Meanwhile, Lucas' second strike – aircraft 5M, 5H and 4G of 817 Squadron – found themselves to starboard of the battleship's track, so they crossed her wake, and made their approach off her port quarter. When *Tirpitz* turned to port it put them in a better position. The sub-flight dropped its torpedoes 30 seconds after 0921hrs, then turned away. However, the torpedo run was excessive – almost 2,000 yards – and again the torpedoes missed their target. Lucas reported that the closest only came within 150 yards of their target.

That left the two sub-flights led by Lieutenant Commander Sugden (1/817 Squadron and 2/832 Squadron), who ordered them to keep on the starboard side of the battleship and to try to get ahead of her. The six aircraft now attracted all the German flak, from both *Tirpitz* and the *Friedrich Ihn*. The two sub-flights were flying almost directly into the 35-knot wind, so progress was agonizingly slow. Then, at 0925hrs, *Tirpitz* began turning to port, as Topp resumed his easterly course. This also put Sugden's aircraft in a better attacking position.

They were now about 2,500 yards off the battleship's starboard bow, with one sub-flight ahead of the other. On Sugden's command they both turned and began their torpedo runs. To the south 4M of 832 Squadron dropped its torpedo 30 seconds after *Tirpitz* began her turn, while 1,000 yards to the north two aircraft from Sugden's sub-flight of 817 Squadron (5L and 5B) released their torpedoes at virtually the same moment. The sixth aircraft, 4R of 832 Squadron, was on Sugden's starboard quarter, and it dropped its torpedo with the others. However, as they began their run two of the aircraft – 4P from 832 Squadron and 5C from 817 Squadron – took direct hits and both aircraft crashed into the sea. Somehow the other aircraft managed to avoid the storm of flak, and released their torpedoes.

Four torpedoes were now heading towards the *Tirpitz*, which had completed her turn, and was settling onto her new easterly course. All of them had dropped their torpedoes early, though – post-engagement reports estimate that the distance was 1,600 yards. Once again, *Tirpitz* was able to comb the oncoming torpedo tracks. All of the torpedoes passed in front of her, although one was within 20 yards of the battleship. On board *Tirpitz*, Lieutenant

Räder recalled seeing a British airman, sitting on the top wing of his biplane as it wallowed in the swell. As the surviving aircraft flew out of range, the battleship continued on towards the Vestfjorden, and shortly before 2000hrs she dropped anchor in the Bogenfjord, a small arm of the larger Ofotfjorden, facing Narvik.

The surviving Albacores all made it back to *Victorious* by 1100hrs that morning, but no further strikes were attempted. In his report, Captain Bovell of *Victorious* criticized the inexperienced Lucas for attacking from a disadvantageous position. However, while the Fleet Air Arm officially deemed the strike 'disappointing', Vice Admiral Ciliax praised the courageous nature of the attack. The fact remained, however that the Fleet Air Arm had missed a rare opportunity to attack the *Tirpitz* at sea. Few knew it at the time, but it would also be the Home Fleet's last chance to strike her on the open sea.

Tirpitz remained in the Bogenfjord for three more days. Then, just before midnight on 12 March, the battleship and five destroyers slipped out of the fjord, hidden by darkness and poor visibility. The British were unaware that the *Tirpitz* had sailed south until the evening of 13 March, when Norwegian agents reported her arrival back in the Faettenfjord. While Operation *Sportpalast* might have been a failure for both sides, it had one lasting consequence. When he learned of the air strike Hitler ordered that in future the battleship would only sortie if British aircraft carriers were neutralized first. Meanwhile, *Tirpitz* would remain in the Faettenfjord.

Bomber Command tries again: March–April 1942

The March raid

Once again, Bomber Command was ordered to deal with the battleship. Daytime attacks were ruled out, as the greater risks outweighed any improvement in bombing accuracy. Any attack would be carried out at night, preferably when moonlight illuminated the target. Given the range, this necessitated starting the raid from north-eastern Scotland. This time, two new types of ordnance were available. The first of these was the 4,000lb HC 'blockbuster' bomb (nicknamed the 'cookie'), which had to be dropped from at least 4,000ft to avoid

Built to specifications issued by the Air Ministry in 1936, the Handley Page Halifax proved a reliable four-engined heavy bomber, although it was less versatile than the Avro Lancaster, as its bomb bay was incapable of being modified to fit extremely large bombs such as the Tallboy.

damaging the aircraft. A spherical contact mine was also available, having been modified so it could be dropped from a heavy bomber.

On 27 March, 44 and 97 Squadrons from 5 Group sent 12 Lancasters to Lossiemouth, six from each squadron. 10 Squadron of 4 Group also arrived with ten Halifaxes, while the 12 Halifaxes of 35 Squadron and ten from 76 Squadron from the same group went to nearby airfields at Tain and Kinloss. All of these planes were modified to take extra fuel. The idea was to arm the Lancasters and 76 Squadron with 4,000lb 'cookies', as well as 500lb bombs. The Halifaxes of 10 and 39 Squadrons would each carry four mines.

The ten Halifaxes carrying the 'cookies' would fly up the fjord and precision-drop their bombs on *Tirpitz* from a height of 4,000–5,000ft. After releasing the 'cookies', they were to circle around and use their 500lb bombs to target nearby flak positions. Meanwhile the 12 Lancasters would drop their 'cookies' on nearby Vaernes airfield. It was expected that this phase would take place on 30 March between 2145hrs and 2230hrs.

This second phase involved the 22 mine-carrying Halifaxes approaching *Tirpitz* from the west, then releasing the mines from 600ft. The aim was to target the stern, or just behind it, or to drop the mines between the battleship and the shore. The hope was that the damage caused would force *Tirpitz* to return to Germany for repairs. Both weapons, though, were untested on capital ships.

At the last moment the Lancaster part of the operation was cancelled. So, at 1800hrs on 30 March, the 32 Halifaxes took off and headed out over the North Sea. Destroyers were stationed along the route in case aircraft had to crash-land in the sea. The flying time to the target was three-and-a-half hours, and the return leg, which passed close to Orkney and Shetland, was 30 minutes longer. When the bombers got within 100 miles of the Norwegian coast they dropped to 500ft, to reduce the risk of detection by German radar. In fact, they were detected and the defenders were ready for them.

The flight to the target was uneventful, but when the first wave of Halifaxes from 76 Squadron reached the fjord they found that cloud formed a dense band from 1,000 to 6,000ft. *Tirpitz* was completely obscured. At 2200hrs the flak batteries opened up as the bombers approached the unseen battleship, their crews hoping for a break in the clouds. On board *Tirpitz* they heard rather than saw the aircraft, but Captain Topp ordered the ship's anti-aircraft guns to hold their fire for the moment, to avoid revealing their position.

Still, the flak from the shore batteries was heavy, and four bombers were shot down over the fjord. Some 25 bombs were dropped on flak positions but *Tirpitz* remained untouched. The aircraft circled around until fuel began running low, and then they headed home. Two more damaged bombers were forced down in the North Sea , which brought the total losses to six aircraft – two from 10 Squadron, three from 35 Squadron and one from 76 Squadron. The official report on the mission concluded that 'Thick cloud over the target and mist in valleys and fjords made identification of the battleship impossible'. In fact they never even got close to spotting it.

The first April raid

For the moment the bombers were returned to their regular schedule of raids over Germany. Meanwhile, PRU flights revealed a strengthening of the anti-aircraft defences in the area, and the reinforcement of the air base at Vaernes. *Tirpitz* remained in the Faettenfjord, covered by her camouflage screen and protected by torpedo nets. Churchill and the War Cabinet insisted that another attempt be made as soon as possible, so the planners at Bomber Command set about organizing a further strike. The basic plan would remain the same, but the attack would take place later – around midnight – as it was thought the defenders would be less alert.

Experience had shown that releasing a 'cookie' at anything below 6,000ft risked damage to the aircraft, so the height of the bombing run was altered accordingly. Similarly, trial and

error during practice flights had shown that the optimum height for dropping the mines was 150ft, so this release height was changed too. The bombers would now fly closer to Orkney and Shetland on both legs, to improve the chances of rescue if forced to ditch in the sea. Also, a model of the Faettenfjord had been produced, and this greatly helped the crews understand the geography of the target area.

The planners were aware that on the last occasion the Germans had been ready for them, and they put this down to the efficiency of the German radar chain. So, both before and during the raid, secondary attacks would take place elsewhere to distract the radar operators. A squadron of Hudsons would raid shipping off Ålesund, 150 miles south of Trondheim, while pairs of Beauforts would carry out hit-and-run raids on Lade and Vaernes airfields near Trondheim, as well as Herdla airfield near Bergen.

In the final briefing, the bomber crews were ordered to fly up the Trondheimsfjord, then begin their bombing runs over Saltøya Island, 1½ miles west of the *Tirpitz*. After the attack they were to turn to port, passing over the Lofjord before heading back along the northern shore of the Trondheimsfjord. For those planes carrying mines, it was stressed that if they couldn't see the target they should drop their mines over the high ground beside the battleship. That way the mines might roll down the slope and explode between the ship and the shore. At 150ft, though, that meant having to avoid her mainmast, the tip of which was 165ft above the battleship's waterline.

The mission was due to begin on the evening of 25 April, but for the next two days the airfields were fogged in. Finally, at 2000hrs on 27 April, the bombers took off. Two Lancasters were forced back due to mechanical trouble, but a reserve Lancaster was sent up to take their place. A total of 42 bombers were now en route to the target, 31 Halifaxes and 11 Lancasters, all flying at 5,000ft.

The route took them north past Shetland, and then north-east to a point 70 miles from the Norwegian coast at Ålesund. They would then fly north, before turning west-north-west for their final approach to the fjord. The first wave was due over the Trondheimsfjord shortly before midnight. Two hours into the mission one more Halifax was forced back due to engine failure. The rest finally crossed the Norwegian coast above Kristiansund, climbed to 12,000ft and began their final approach.

Despite all the diversions the Germans spotted the bombers on radar, and were ready for them. One airman recalled, 'As we neared the coast we could see flak inland, and as

500lb general purpose (GP) bombs being loaded into the bomb bay of a Halifax heavy bomber. During the Bomber Command raids on *Tirpitz* in early 1942, this bomb type was among the assortment of ordnance used against the battleship, or carried to deal with flak batteries around the Faettenfjord.

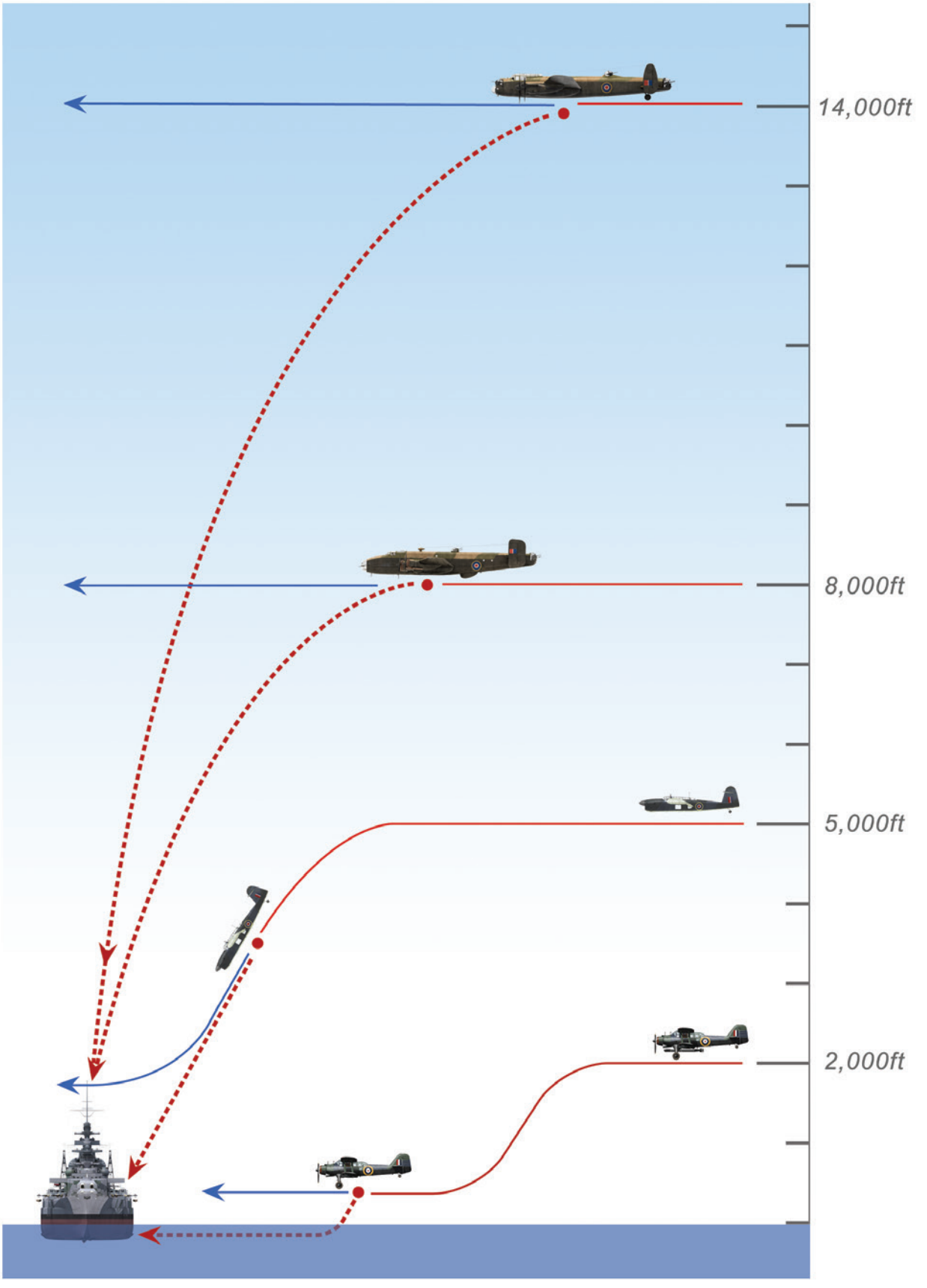
In the Faettenfjord the crew of the *Tirpitz* had to become adept at camouflage. Sharp surfaces were draped with tarpaulins and any other material that came to hand, while fir trees were used to break up the lines of the deck. Eventually a series of camouflage nets attached to the shore and to rafts moored at the bow of the ship would shroud the ship even more effectively.

we crossed it our worst fears were confirmed.' This was due to the diversionary raid on Trondheim by Beaufighters. All it really achieved was to keep the anti-aircraft gunners alert. So, as soon as the bombers appeared over the Trondheimsfjord they encountered heavy flak.

The first wave consisted of the Lancasters carrying the 4,000lb 'cookies'. The Halifaxes of 76 Squadron followed behind them. As the bombers made their final approach they found that some flak batteries on the high ground flanking the fjord were actually firing down at them. Searchlights, flares and lines of tracer lit up the sky. This time, with the clouds above the bombers, and the area illuminated, the battleship was clearly visible.

As the bombers passed Saltøya Island they encountered a box barrage of flak. One of the Lancasters from 97 Squadron was hit and spiralled downwards to crash in the mountains to the east. None of its seven-man crew survived. Somehow the other bombers made it through and at 0006hrs the leading Lancaster of 44 Squadron dropped its 'cookie' over the target from 7,500ft. The rest of the wave did the same. Some of the crews thought they saw their bombs hit the ship, but in fact none of the bombs struck their target.

At this stage *Tirpitz* was still visible, as her smoke screen still hadn't been deployed. The smoke was finally released at 0012hrs, and was fully in place when the mine-dropping Halifaxes arrived. Many of the crews didn't get a clear view of *Tirpitz* during their attack, and dropped their bombs or mines on where they thought the battleship was through the smoke. Still, the bombers in the wave completed their run, and banked away to the north. Some even circled round for a second pass before dropping their bombs and banking away. One Halifax of 76 Squadron left it too late and dropped its 'cookie' on the *Admiral Scheer* instead.


14,000ft
8,000ft
5,000ft
2,000ft

OPPOSITE BOMBING TECHNIQUES EMPLOYED AGAINST *TIRPITZ*, 1942–44

This diagram illustrates the four bombing techniques used against *Tirpitz* during her time in Norwegian waters. At the top is an Avro Lancaster heavy bomber, carrying a single 12,000lb deep penetration bomb, or Tallboy. The optimum height for the bomb's release was 13,500–14,000ft, with the aircraft flying level at approximately 200mph. In fact, release heights during the three Tallboy attacks on *Tirpitz* varied from 12,000 to 17,400ft. The release point was calculated by means of a specially developed SABS Mark IIA bomb sight, and the bomb rotated rapidly as it fell, which increased accuracy considerably. Its strong construction and high terminal velocity ensured that it would penetrate the armour of the battleship, while even a near miss would rely on the 'earthquake' effects of the bomb's blast to cause severe underwater damage to the target.

During the RAF's raids on the Faettenfjord in 1942 it was intended that the Handley Page Halifax heavy bombers who took part in the missions would fly over the target at an altitude of around 6,000–8,000ft, maintaining a steady airspeed of around 220mph. However, after the first attack in January, it was felt that accuracy would be improved by reducing the bombing height to around 6,000ft. Any lower and those bombers using the 4,000lb HC bombs that some of these bombers carried on the spring raids risked being damaged by the explosion of their own ordnance. Those Halifaxes carrying spherical mines dropped them from 200–250ft.

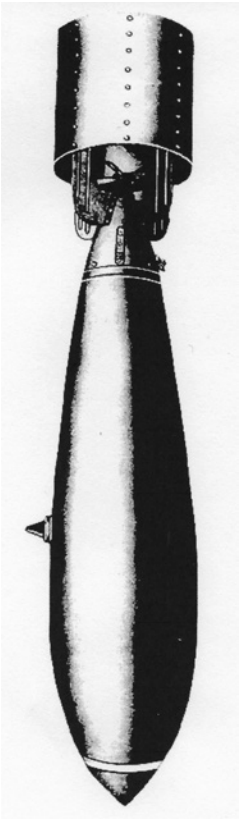
When the Fleet Air Arm used the Fairey Barracuda dive/torpedo bomber to attack *Tirpitz* in the Kaafjord during the late spring and summer of 1944, the aircraft approached the target at a height of around 5,000ft; they would then dive at an angle of around 45 degrees or more, before releasing their bombs at a recommended height of 3,500ft. A dive angle of 65 degrees or more would place a dangerous strain on the airframe of the bomber. The heaviest piece of ordnance carried in these strikes was the 1,600lb AP bomb, which was aerodynamically designed to spin quickly as it fell, and to strike the ship at a high velocity, which increased its ability to penetrate the deck armour of the target.

Finally the Fairey Albacore was also capable of carrying bombs, but the diagram here shows how the aircraft was used during a torpedo attack of the kind conducted by the Fleet Air Arm against *Tirpitz* in early 1942. On approaching the target the biplane would fly at an altitude of around 2,000ft, then drop down to within 100ft of the sea before releasing its 18in torpedo. At this point its airspeed would be around 100 knots. The ideal range was about 1,000 yards from the target, but in practice the ordnance was often released sooner, at ranges of up to 1,500 yards. The torpedo travelled at 40 knots. Ideally the torpedo would be aimed ahead of the battleship, to compensate for the movement of both the torpedo and the target, until ideally both converged at the aiming point.

The job of the first wave wasn't done. They still had to release their 500lb bombs on flak positions, and then circle, drawing flak away from the second wave. The second wave, the mine-carrying Halifaxes of 10 and 35 Squadrons, flew past Trondheim at around 0025hrs. However, by the time they reached Saltøya Island the Faettenfjord was filled with smoke. By then the bombers had dropped down to 250ft, and with 35 Squadron leading, they began their attack at 0040hrs.

Although the German flak batteries were fully alert, they had been firing at high-flying bombers, so at first these low-flying newcomers took them by surprise. Most of the bomber crews never saw the battleship through the smoke, but their study of the model of the fjord paid off. Of the 11 aircraft in 35 Squadron, seven dropped their mines in the area of the target. Of the others, one bombed a patrol boat, and another Halifax was shot down over the Åsenfjord before it reached its target.

As soon as the bombers released their mines they banked to port, and skimmed over the Lofjord before making their escape up the Trondheimsfjord. The last group to make its attack was the Halifaxes of 10 Squadron. They approached the target at about 0105hrs, and dropped their mines from heights of 200ft or more, in the vain hope of seeing the battleship's masts above the smoke. One airman, Flying Officer Watts, recalled the experience as he entered the Faettenfjord: 'At that very moment we flew into a smoke screen so dense it seemed to be solid. It was like flying in cotton wool. There was no sense of motion, no spatial relativity. We knew we were thundering alongside a solid rocky cliff wall … speeding towards an equally solid cliff wall not far ahead – all sight unseen.' He released his bomber's



The British 500lb semi-armour piercing bomb was used against the *Tirpitz* in all three of the RAF raids on her in the Faettenfjord during the spring of 1942, and the Fleet Air Arm attacks on the battleship in the Kaafjord during the summer of 1944.

mines when he thought the *Tirpitz* was roughly beneath them, and the pilot banked away, hoping to clear the cliff ahead of them. As Watts put it dryly, 'No one would have wished to end their life like a fly squashed on the wall.'

By 0120hrs, the last of the bombers was heading homeward. One of the 10 Squadron bombers had to ditch in the Trondheimsfjord, while another damaged plane crash-landed further inland, on the frozen surface of Lake Hoklingen. Both crews survived, and apart from one injured airman they even escaped captivity by making it over the Swedish frontier. In total five aircraft were lost – four Halifaxes and one Lancaster. However, for all this effort and these losses, the *Tirpitz* was completely undamaged. All of the 'cookies' missed, while the smoke screen protected her from the mines. At dawn the crew of the *Tirpitz* found the surface of the Faettenfjord covered by dead fish, killed by the exploding mines. So, as the exhausted bomber crews returned to their rooms and slept, the decision was made to repeat the attack the following night.

The second April raid

The only major change was in the timing. By the time the mine-dropping aircraft reached the Faettenfjord the *Tirpitz* had been hidden by smoke. So, this time a tighter schedule was planned, with very little gap between two waves. This time, the first wave consisted of nine Halifaxes from 76 Squadron and six Lancasters each from 44 and 97 Squadrons. All but one of these bombers would carry a 4,000lb 'cookie' and 250lb or 500lb GP bombs, while one Lancaster attached to 76 Squadron only carried a mixture of the smaller bombs. Once again, the 15 remaining Halifaxes from 10 and 35 Squadrons were armed with five spherical mines apiece.

On the evening of 28 April the bombers took off from 2030hrs, with the 76 Squadron Halifaxes joining up with the Lancasters to form the first wave. One of the mine-laden Halifaxes failed to take off due to mechanical trouble, which reduced the strength of the second wave to 14 aircraft. This time there was a scaled-back version of the diversions intended to confuse the German radar operators. Also, they would take place just before the bombers arrived, to avoid alerting the defenders. Ahead of the bombers a diversionary force of four Beaufighters crossed the coast, and kept a lookout for enemy fighters. In fact although several 'nightfighters' were reported over Trondheimsfjord, no German aircraft were in the vicinity. The likelihood is that these were actually the Beaufighters, which were circling over Trondheim as the first wave flew past. Only one German fighter was in the area, and it was ordered to keep out of the way of the flak barrage.

The British plan called for the first wave to release their 4,000lb bombs between 0030hrs and 0040hrs. The second wave, flying in low, were expected to drop their mines between 0041hrs and 0050hrs. After bombing the main target, the bombers would bank away to the north, releasing their smaller bombs over flak batteries or other targets before heading home. By now the force had been reduced further, as two Halifaxes from 35 Squadron had been forced back due to engine failure. Visibility was good, but the crew of the *Tirpitz* were forewarned, and this time the smoke screen was deployed before the first wave even reached the target.

The 'cookie'-armed bombers dropped their ordnance into the smoke from 6,000–8,000ft. Some of the Lancasters held on to 'cookies' and instead they released them over the *Admiral Scheer* and *Prinz Eugen*, in the Lofjord, which for some reason was free of smoke. It was significant that while some of these crews later asserted that the flak was heavier than the night before, some of the crew of the second wave claimed the opposite. This suggests that the flak guns were targeting the higher-flying bombers. It was only after the second-wave bombers climbed out of the smoke that they faced the full brunt of enemy flak. The bombers dropped their smaller bombs at targets between the Faettenfjord and the Lofjord, but one plane, forced off course by flak, released its 'cookie' over Vaernes airfield, a few miles away to the south.

Then it was the turn of the mine-laden Halifaxes. This time the majority of them released their ordnance from around 150–250ft, and strangely, while the smoke screen obscured the target, a gap in it appeared during the bombing run, so some of the aircraft had a good clear view of the *Tirpitz*. Until then the battleship's anti-aircraft gunners had held their fire to avoid revealing their position. Now they blazed away. Several of the bombers were damaged, but somehow all of them made it out of the fjord. In one Halifax from 35 Squadron the pilot recalled that 'We were so low on the treetops that the mid-upper gunner reported that we had disturbed a bird from her nest, to which the rear gunner added that there were four eggs in it!'

Again, the bombers released their smaller 500lb bombs over flak installations to the north of the Faettenfjord. Then the planes turned west over the Lofjord. A few bombers found that their mines were jammed in their bomb bays, and had to be prised out during the flight home. Two Halifaxes from 35 Squadron were shot down in the raid. One limped up the Åsen valley, flying west until it crashed on the shores of Movatnet (Lake Movaten), just 3 miles beyond the spot on Lake Hoklingen where another Halifax from the same squadron had crashed the night before. The second caught fire and spun down into the Åsenfjord. In both cases the majority of the crew survived the crash, but became prisoners of war.

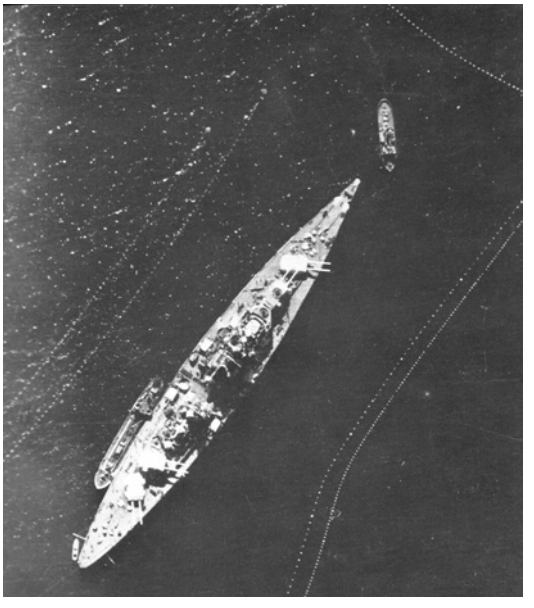
In all, 18 'cookies' and 48 mines were dropped that night, but none of them hit the *Tirpitz*, or at least caused her any damage. Many of the mines lodged in the steep wooded slope on the north side of the fjord. Others landed in the fjord, and the battleship's crew could feel the pressure waves from their explosions transmitted through the water. Once again, though, the only significant casualty was the fish of the Faettenfjord. The smoke screen had done its job.

Despite plans for more operations, it was decided that this would be the last raid by Bomber Command for some time. These had been night raids, carried out by night bombers, and with spring turning to summer the days were getting longer. So, further attacks were suspended until the autumn. The air crews needed a break too. They had suffered significant losses: 10 Squadron had lost four Halifaxes, 76 Squadron had lost one and 35 Squadron seven bombers. One Lancaster of 97 Squadron had also been shot down. A total of 60 airmen had been killed during the three missions, and 18 taken prisoner. That amounted to approximately 12 per cent of the men who had participated in the attacks. All this sacrifice had been in vain. *Tirpitz* remained undamaged, and the threat she posed to the Arctic Convoys was as great as ever.

RAF Bomber Command losses during *Tirpitz* attacks, spring 1942

	Mission			Total aircraft losses	Crew losses		
	30/31 March	27/28 April	28/29 April		Killed	POWs	Rescued/escaped
10 Sqn	2	2	-	4× Halifaxes	16	8	-/4
35 Sqn	3	2	2	7× Halifaxes	30	10	-/4
76 Sqn	1	-		1× Halifax	7	-	7/-
97 Sqn	-	1	-	1× Lancaster	7	-	-

Notes:
In addition, a Beaufighter (248 Squadron) was lost on 27/28 April (2 crew killed), while throughout March and April 3 PRU Spitfires were shot down in the area (2 crew killed, 1 POW).
Incidentally, in 2008, Halifax 'S-Sugar' (W1048) of 35 Squadron, which crash-landed in Lake Hoklingen on the night of 27/28 April, was recovered by divers in 1973. The aircraft was subsequently transported to Britain, where it was restored. It is now displayed in the RAF Museum.



Tirpitz in the Bodenfjord near Narvik, photographed in July 1942 by a high-flying PRU plane. The battleship is protected by a double line of torpedo nets, while supply and support vessels cluster around her. While this base was beyond the effective range of bombers flying from Britain, she was still at risk from attacks launched by British carriers.

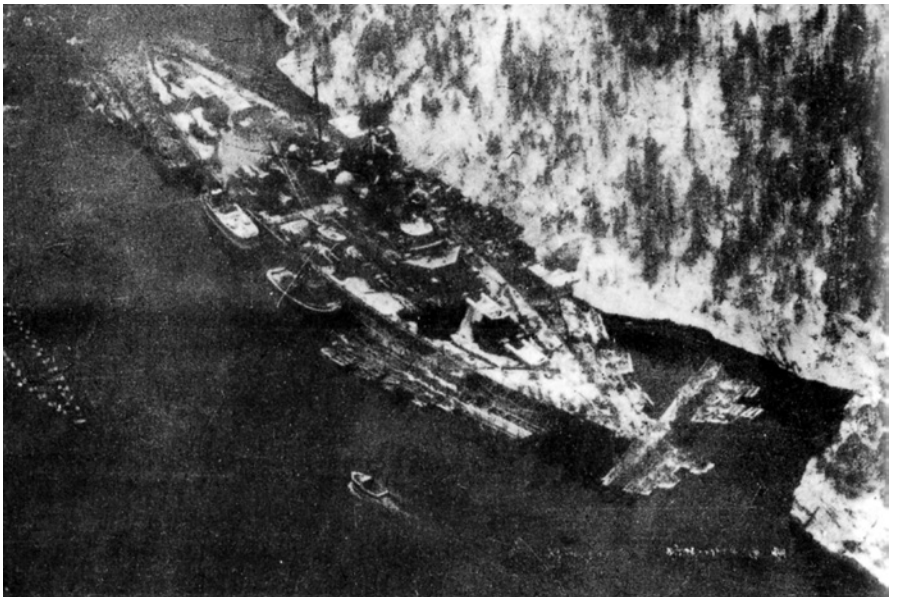
Hiatus: May 1942–April 1944

This failure by Bomber Command was to have grave consequences. It was now late spring in the Arctic, and the days were getting longer. The long winter nights had helped screen the convoys from Luftwaffe search planes and U-boats, but now the season of near-perpetual sun was approaching. During the winter the Luftwaffe had reinforced its air bases in Norway, and now Luftflotte 5 had the capacity to search far out into the Arctic Sea, and carry out large-scale attacks using torpedo- and bomb-armed aircraft. While the Admiralty would have liked to suspend convoy operations until the autumn, Churchill was under pressure from both Roosevelt and Stalin, so he ordered that they continue, regardless of the risk. What followed would show just how much an influence the *Tirpitz* exerted on this naval campaign.

In mid-May 1942, the Admiralty learned that the Germans were planning a strike against the next Arctic Convoy. Codenamed Operation *Rösselsprung* (the knight's move in chess), this would involve a task force commanded by Admiral Otto Schniewind, whose flagship was *Tirpitz*. On 27 June, Arctic Convoy PQ-17 sailed from Hvalfjörður in Iceland, bound for Archangel. It consisted of 35 merchant ships and 14 escorts, while a 'Covering Force' of four heavy cruisers shadowed it. Admiral Tovey commanded the 'Distant Covering Force' of two battleships and the carrier *Victorious*. In theory this should have been a powerful enough force to thwart any move made by Admiral Schniewind.

On 1 July, PQ-17 was spotted by a U-boat, and at 2000hrs the next day *Tirpitz* put to sea, accompanied by the armoured cruiser *Admiral Scheer*, the heavy cruiser *Admiral Hipper* and four destroyers. A second armoured cruiser, *Lützow*, was damaged by grounding while attempting to accompany Schniewind's force, so she returned to Narvik for repairs. By the morning of 4 July the German task force was anchored in the Altenfjord, near the northernmost tip of Norway. There, Schniewind waited for the order to strike.

Tirpitz in the Altenfjord in July, waiting to play her part in Operation *Rösselsprung* – the attack on Convoy PQ-17. As the sun is setting, her anti-aircraft guns are elevated, ready to counter any sudden air attack from either the Fleet Air Arm or the Soviet Air Force.



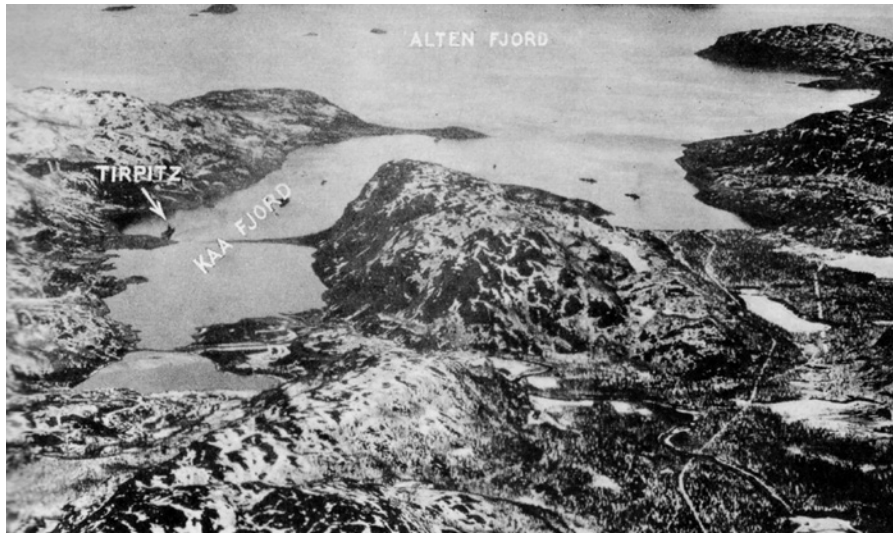
The *Tirpitz*, photographed in the Faettenfjord by a low-flying PRU aircraft during the winter of 1942–43. She lies at her regular berth on the north side of the small fjord, surrounded by a cluster of smaller vessels, with pontoons carrying camouflage netting sitting off her bow and stern.

Meanwhile PQ-17 continued its voyage, the escorts successfully fending off attacks by German torpedo bombers. However, that afternoon the British Admiralty learned that *Tirpitz* was in the Altenfjord, just a few hours away from the convoy. Neither the cruiser covering force nor the escort could protect the convoy from *Tirpitz*, and Tovey's capital ships were 350 nautical miles to the west – too far away to intervene. PQ-17 was on its own.

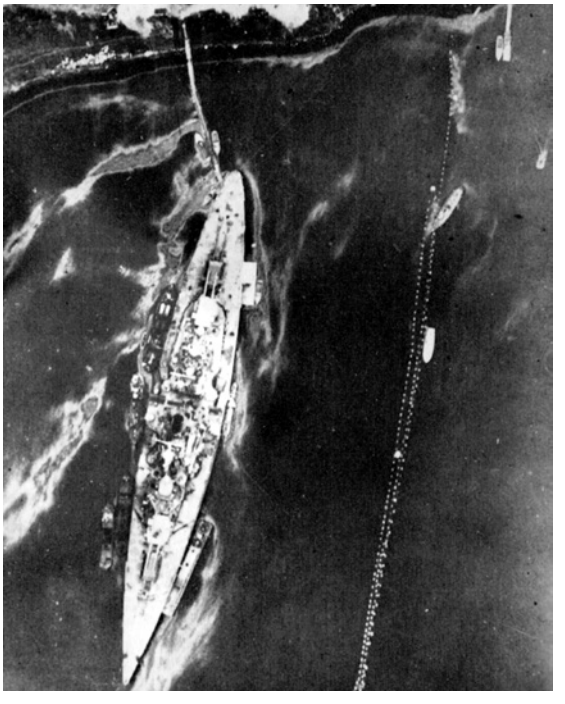
The First Sea Lord, Admiral of the Fleet Sir Dudley Pound, then made one of the most controversial decisions of the naval war. At 2100hrs that evening he ordered the convoy to scatter, and the cruisers to withdraw to the west. For the next few days, the merchant ships tried to reach the safety of Soviet ports. Most never made it, being picked off by U-boats and Luftwaffe bombers. Of the 35 merchant ships which sailed from Iceland, only 11 made it to safety.

Ironically, the First Sea Lord gave his 'scatter' order when he thought that *Tirpitz* was about to fall upon the convoy. In fact, she remained in Altenfjord until 1120hrs on 5 July. Even then, after a brief sortie (5–6 July), Hitler was alarmed that a British carrier was at sea, and that evening he cancelled the operation and ordered Schniewind to return to the fjord. Ironically, *Victorious* was too far away to intervene. By 9 July, *Tirpitz* was back in the Bogenfjord, near Narvik. The whole operation revealed just how much Hitler feared British naval air power, and just as significantly, how much *Tirpitz* was viewed as a 'bogey man' by the British Admiralty.

The extent to which *Tirpitz* dominated naval



In this high-altitude photograph taken by a Soviet reconnaissance plane in May 1943, and subsequently marked by Admiralty intelligence analysts, *Tirpitz* can be seen moored close to the north-western side of the Kaafjord, while support vessels are anchored further north, and in the small bay off Kvenvik, to the south-east.



Tirpitz in the Kaafjord in late September 1943, pictured by a PRU aircraft in the immediate aftermath of Operation *Source*, the attack on her by British midget submarines. Oil can be seen leaking from her fuel tanks, while various small support vessels cluster around her, inside her torpedo nets. Astern of her is a walkway linking her to the shore, and the small boat landing stage is on the spit behind her.

planning was displayed again later in July, when Convoy PQ-18 was postponed. The reason was that PRU flights over the Faettenfjord had revealed that the battleship's moorings were empty. This led to Stalin accusing the Royal Navy of shirking a fight at a time when Russian servicemen were fighting for their very survival. Actually *Tirpitz* was still in the Bogenfjord taking part in gunnery exercises. By 24 October she was back in the Faettenfjord. It was there that the British carried out another attack on her. Operation *Title* involved the ferrying of human torpedoes (known as 'chariots') across the North Sea from Shetland, towed beneath Norwegian fishing boats. Once in the Trondheimsfjord they and their two-man crews would be sent off to attack the battleship. The operation was due to be carried out during the night of 30/31 October. However, unexpected rough weather led to the attack being abandoned. At the time the chariots were in the Åsenfjord, just 5 miles from their target.

During all this, the idea of carrying out another bomb attack on the *Tirpitz* never really went away. In June a plan for a Lancaster raid was drawn up, flying from Lossiemouth. This time the bombers would carry either 4,000lb 'cookies' or smaller AP bombs. This scheme was put on hold when the *Tirpitz* spent the summer in the Bogenfjord, as it was beyond effective range. The return of *Tirpitz* to the Faettenfjord led to the scheme being revived. This developed into a daylight attack using 81 Lancasters, but by November the notion was shelved again, largely due to the onset of the long winter nights. Another scheme using US Air Force B-17s was mooted, flying from a base near Murmansk, but this was never fully pursued. So, as 1942 drew to a close *Tirpitz* remained a latent threat.

What almost ended this threat without a bomber being risked was the battle of the Barents Sea. On New Year's Eve 1942 *Lützow*, *Admiral Hipper* and seven destroyers attacked the Arctic Convoy JW-51B. The Germans were driven off by British light cruisers and destroyers, and *Hipper* was damaged. Hitler was so outraged by this failure that he threatened to disarm the Kriegsmarine's larger surface ships and use their guns as coastal defence pieces. He had never grasped the notion of 'a fleet in being', whereby the presence of *Tirpitz*, for example, tied down a larger number of enemy warships. This led to the resignation of Grand Admiral Raeder, and his replacement by the U-boat chief, Admiral Dönitz. For a while the fate of *Tirpitz* looked bleak, but in February Hitler relented, and the battleship was spared. In fact, under Vice Admiral Oskar Kummetz she became the flagship of a battle group that also included *Scharnhorst* and *Lützow*. Meanwhile, in late February, Captain Topp was promoted, and Captain Hans Meyer became the new commander of *Tirpitz*.

By the start of 1943 Bomber Command began exploring other options, including the use of a 'bouncing bomb' of the kind used by Lancasters of 617 Squadron during their attacks on German dams that May. However, despite extensive testing, it never proved suitable for attacks on a battleship. By the spring the daylight heavy bomber raid planned the previous year might have been resurrected but in mid-March a PRU flight revealed that the Faettenfjord was empty again. This caused concern in the Admiralty, who feared that *Tirpitz* might be attempting a break-out into the North Atlantic. Then, on 24 March, she reappeared in the Kaafjord, at the end of the Altenfjord, her base during Operation *Rösselsprung* the previous summer. This would be the battleship's new lair for the next 16 months.

The Kaafjord was well beyond the range of most aircraft flying from Britain. The exception was the US Army Air Force's new B-17F, but while the Americans proved amenable to the

The ship's band of the *Tirpitz* play to celebrate the birthday of the battleship's commander, Captain Topp. The band also gave regular concerts on board, to help boost morale, as well as performing ceremonial duties. In action, the bandsmen served as medical orderlies.

idea of using it for a long-range strike, the RAF opposed the plan, as by this stage of the war their priority was the bombing of Germany by both day and night. So, while plans to use Soviet airfields continued to be unfeasible due to diplomatic bureaucracy, *Tirpitz* was left to her own devices, save for flights by the PRU. In September *Tirpitz*, and *Scharnhorst* sortied to bombard Spitzbergen, in an operation designed as much as a training exercise as a demonstration of naval potential. However, German naval power in the Arctic was about to be dramatically undermined.

At 0812hrs on 22 September *Tirpitz* was rocked by two massive explosions. The cause was large mines, placed there by two British midget submarines, or 'X-Craft'. This attack, codenamed Operation *Source*, had been months in the planning, and involved the towing of six of these X-Craft to the mouth of the Altenfjord by British submarines. Once released, three were to attack *Tirpitz*, two *Scharnhorst* and one *Lützow*. In the end the only two X-Craft to reach their target were *X-6* and *X-7* which laid their charges beneath the *Tirpitz* before they were detected, forced to the surface and their three-man crews captured. The first charge exploded level with the battleship's forward turrets, and jammed the mounting. The second buckled the ship's bottom, causing extensive flooding. The result was that *Tirpitz* was put out of action, and would now need extensive repairs before she was operational again. But instead of returning to a German shipyard, the work would be done *in situ* in the Altenfjord. A steamer carrying 750 civilian workmen was sent north, and through that winter these artisans did what they could to repair the damage.

The second blow to German naval power in the region came on 26 December 1943, at the battle of North Cape. In a scheme dubbed Operation *Ostfront*, *Scharnhorst* sortied from the Altenfjord to intercept the Arctic Convoy JW-55A. The convoy was successfully screened by British cruisers, and the German battlecruiser turned away. Before she could reach the Norwegian coast she was cornered and sunk by the Home Fleet, led by its new commander, Admiral Fraser, whose flagship was the battleship *Duke of York*. Her 14in guns made short work of *Scharnhorst*, which sank, taking all but 22 of her crew down with her.

In a few months, what had once been a powerful German battle group had now been neutralized. That winter, PRU Spitfires as well as Soviet reconnaissance flights reported that the steamer *Monte Rosa* housing the civilian workers was berthed alongside *Tirpitz*, as was a 20-ton floating crane and the repair ship *Neumark*. A flak ship and five destroyers

guarded her from a distance, while the fjord was now ringed by anti-aircraft defences and smoke generators, mounted either on the shore or on board moored fishing boats. By late January 1944 the PRU reported that her gun turrets were now able to rotate again, but signal intercepts revealed that she still had engine problems. So, although work on *Tirpitz* was progressing, it would be some while before she was operational.

On the night of 10/11 February a force of 15 Soviet Pe-2 twin-engined bombers took off from Vaenga airfield near Murmansk, each carrying a single 2,000lb bomb. Although the operation began in good visibility thanks to a full moon, by the time the bombers reached the Altenfjord the target area was obscured by squalls of snow. The *Tirpitz* was taken unawares, and there wasn't time to deploy her smoke screen before the bombers arrived. However, owing to the poor visibility only four of the planes spotted the target and were able to release their bombs from 4,000ft. All of them missed the battleship, although the Soviets later claimed that one had been a near miss. Two days later, the Soviets agreed to allow a PRU detachment to be based at Vaenga, and by the end of the month these planes were operational. However, a spate of bad weather and the short days meant that it would be April before these were able to achieve worthwhile results. The images were flown back to Britain by Catalina seaplanes.

This was important, as by the middle of March *Tirpitz* was operational again, although she still had problems with her engines and gun turrets. Only a spell in a German dry dock could fully restore her to her former condition. However, she could steam at 27 knots, despite the vibrations caused by her engine defects. With her guns largely repaired, she could also fight. Consequently the Admiralty still considered her a major threat to convoy operations. Fortunately for them, the Home Fleet now had the strength not only to fully screen these convoys, but also to take offensive action against the *Tirpitz* using naval air power.

The Fleet Air Arm offensive 1944

In late January 1944, the Admiralty ordered Admiral Forbes commanding the Home Fleet to draw up plans to attack the *Tirpitz* in the Altenfjord. They added that the ideal time for this would be 7–16 March – the same time as the battleship was carrying out her post-repair trials. The hope was to catch her manoeuvring in the fjord, beyond the range of her shore-based flak batteries and smoke screens. In fact Forbes was one step ahead of the Admiralty. The previous December he had ordered his deputy, Vice Admiral Sir Henry Moore, to draft plans for a naval air strike on *Tirpitz*, while the battleship was still in the Kaafjord. Moore certainly had enough air power at his disposal, and the operation he came up with would involve no fewer than five aircraft carriers and over 100 aircraft. Still, the operation had to wait until late March, when the fleet carrier *Victorious* would rejoin the fleet after a refit. This attack – the largest air strike yet staged by the Fleet Air Arm – was codenamed Operation *Tungsten*.

Before Operation *Tungsten* commenced, the air crews were briefed on their mission using a detailed scale model of the south-eastern end of the Altenfjord and the Kaafjord. Here, Commander Selwyn Harrison of HMS *Furious* is describing the area's flak defences to the crews of a sub-flight of 830 Squadron's Barracudas.

Operation *Tungsten*

While *Victorious* completed her refit the air crews practised the attack in Loch Eriboll, on the west coast of Scotland. The refit in Liverpool was speeded up, so that by the time a dress rehearsal was staged over the loch on 28 March, *Victorious* was able to take part. Two days later, on 30 March, *Victorious* accompanied Forbes' two battleships as they left Scapa Flow and headed towards the Arctic Sea. Ostensibly Forbes put to sea to cover the sailing of an Arctic Convoy, JW-58. His main aim, though, was to link up with another task force, which had departed in secret

Hellcats of 800 Squadron ranged on the deck of the escort carrier *Empress* on the morning of 3 April 1944, before the start of Operation *Tungsten*. The fleet carrier *Furious* is astern of *Empress*, followed by the escort carriers *Searcher* and *Pursuer*, and an escorting light cruiser.

and was already at sea. This consisted of the carrier *Furious* and the escort carriers *Emperor*, *Fencer*, *Pursuer* and *Searcher*, plus escorts. Once the task forces combined, they would then move into position to the west of North Cape.

The operation was scheduled for 4 April, but the report of good weather over northern Norway encouraged Forbes to bring the attack forward by 24 hours, to 3 April. The two forces rendezvoused in the afternoon of 2 April, and after detaching *Victorious* to join the carrier group, Forbes with his battleships and their escorts left the rest of the force, and moved away to the north-east, where he could cover both the carrier group and the convoy. By dawn on 3 April, the carriers and their escorts, now redesignated as Force 7, were in position. This was 77 nautical miles from the coast and 124 nautical miles north-west of the *Tirpitz*, which the PRU reported was still moored in the Kaafjord. Best of all for the British, it appears that their presence was completely undetected, despite the clear skies and excellent visibility. It couldn't have been a better start to Operation *Tungsten*.

The main strike force was made up of 32 Barracuda dive bombers, divided into two wings, each theoretically consisting of 16 planes. To help the speed of flying off, there had

Fleet Air Arm armourers fusing 600lb AS bombs on the deck of *Victorious* before the launch of Operation *Tungsten*, on 3 April 1944. The chalked '5P' on the nearest bomb indicates that it is destined for Barracuda 5P of 827 Squadron.

been a bit of 'cross-decking' – the moving from one ship to another, so that both *Furious* and *Victorious* carried part of each wing. Using the two carriers simultaneously would greatly speed the take-off and assembly of each strike. The first of these, 8 Wing, was made up of Barracudas from 827 and 830 Squadrons, while 52 Wing, which would fly off second, consisted of 829 and 821 Squadrons. 'Top cover' fighters would be provided by the 21 Corsairs of 1834 and 1836 Squadrons, flying from *Victorious*. For escort during the flight, 40 Wildcats of 881, 882, 896 and 898 Squadrons launching from *Searcher* and *Pursuer*, and 20 Hellcats of 800 and 804 Squadrons from *Emperor*, would protect the Barracudas from the Luftwaffe. So, the strike was made up over 100 aircraft, more than half of which were fighters.

Finally, a combat air patrol (CAP) of 18 Seafires of 800 and 801 Squadrons operating from *Furious* would form a protective shield around the task force to safeguard it from enemy air attacks, while the 12 Swordfish of 842 Squadron embarked in *Fencer* would fly anti-submarine patrols around it. The whole complex operation had been planned by Vice Admiral Moore, who was now on board the battleship *Anson*, which formed part of Forbes' distant covering force. While he retained overall direction of the operation, due to radio silence direct hands-on control fell to Rear Admiral Bisset in the anti-aircraft cruiser *Royalist*, commanding Force 7. The plan called for the dive bombers to carry out their attack in two waves, preceded by the Hellcats and Wildcats, which would swoop in and strafe both the battleship and the flak batteries.

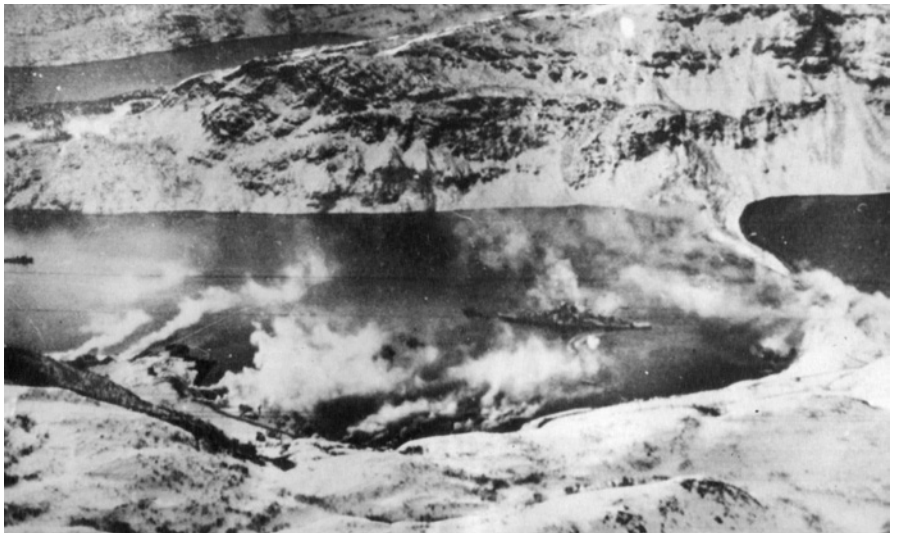
The Barracudas carried a mixture of ordnance: AP bombs, three 500lb SAPs and either three 500lb MCs or two 600lb anti-submarine bombs. All of the Barracudas were ordered to begin their dive from 10,000ft, and release their ordnance at 3,500ft. The idea was that the large bombs would pierce the battleship's armoured deck, while the smaller bombs would cause extensive damage to her superstructure, sensors and weapons mounts. The idea behind the anti-submarine ordnance was that they would be just as effective for this as conventional bombs, with the added bonus that if they missed the ship then they would explode in the fjord, where they might still cause underwater damage. Zero Hour, when the flying off began, was set at 0415hrs.

The Hellcats of 804 Squadron lined up for take-off on the small flight deck of the escort carrier *Empress,* at the commencement of Operation *Tungsten*. These ten fighter aircraft would form part of the second wave during that morning's attack on the *Tirpitz*.

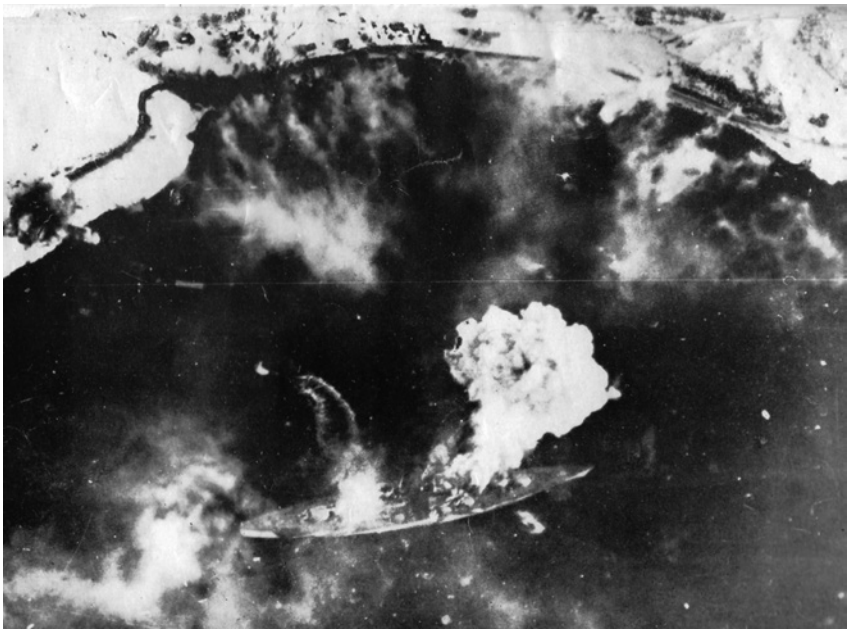
During the voyage north the air crews all had the chance to study models of the Altenfjord, and so were familiar with the geography of the area. A final briefing was held at 0330hrs, and then at 0416hrs 11 Corsairs were flown off from *Victorious*. Unlike the other planes they had spent the night ranged on the carrier's flight deck, and so while the briefing was being held the flight deck staff were kept busy de-icing them. Still, they all took off successfully, and were followed eight minutes later by the 21 Barracudas of 8 Wing, launched simultaneously from *Furious* and *Victorious*. While they were taking off, the Hellcats and Wildcats were launched from the three escort carriers and formed up above the bombers. The second wave would follow an hour behind the first. By 0437hrs the first wave of the strike had formed up, and it set off towards the target, flying on an east-south-easterly course of 120 degrees. The flying time to the target was around 50 minutes.

The *Tirpitz* in her first mooring place in the Kaafjord, in the little bay of Barbrudalen, on the north-western side of the fjord. The photograph was taken by a British PRU flight. The battleship was screened by torpedo nets, and a walkway from her stern led to the spit astern of her, and a small boat dock. *Tirpitz* was in this mooring during Operation *Tungsten*, but in the spring of 1944 she moved to a second mooring, 300 yards to the south-east.

At first the strike force stayed low, below 4,000ft, to avoid detection by German coastal radar. Then, when they were 25 miles from the coast, the Barracudas climbed to their optimal dive-bombing height of 10,000ft. The Corsairs circled above them, while on the flanks of the dive bombers the smaller fighters had to circle and weave, to keep pace with the slower strike aircraft. They reached the coast at 0515hrs near the small island of Loppa, some 40 nautical miles north-west of their target. The route took them over snow-covered mountains and two smaller fjords, the Øksfjord and the Langfjord, both of which were used as destroyer anchorages. Sure enough, some crews saw two ships open fire, but they were well out of range. Then, 10 miles or three minutes' flying time from their target, Lieutenant Commander Baker-Falkner, who commanded the strike, ordered 830 Squadron to tuck itself in behind 827 Squadron. He planned to attack in a long single column of bombers.



During Operation *Tungsten*, on 3 April 1944, *Tirpitz* was taken by surprise as she was putting to sea. This shows her after the attack by the first wave, manoeuvring in the Kaafjord, with her protective smoke screen only just beginning to cover the fjord. A few minutes later she was attacked by the second wave of Barracudas.



This photograph of *Tirpitz* was taken during Operation *Tungsten*, on 3 April 1944, shortly after the end of the first wave's attack. The battleship has been hit, and smoke is pouring from the port side of its forward superstructure. The battleship is moving slowly into the fjord, while the shore-mounted smoke generators are only just beginning to spread a covering layer of white smoke over the area.

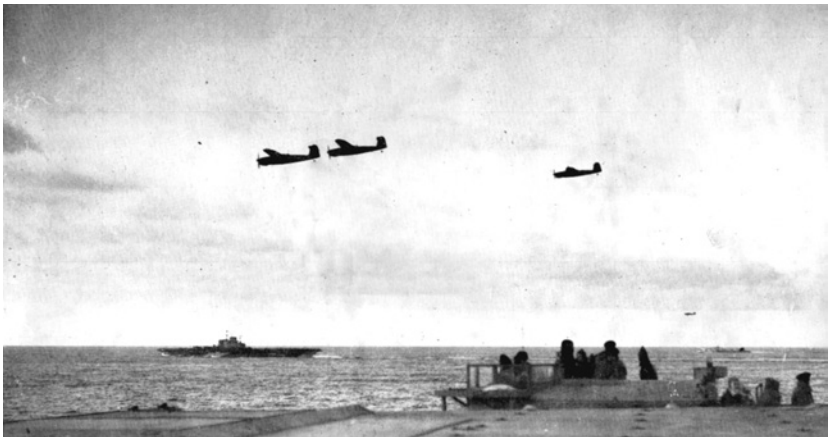
A young New Zealand airman from 827 Squadron remembered flying towards a final ridge in front of the fjord: 'Then suddenly, with a surge we were over the top, and there beneath us lay the *Tirpitz*, and in exactly the place we'd been told to look for it.' For the crew of the battleship, the appearance of the aircraft came as a complete surprise. She was just about to slip her moorings and put to sea, to carry out speed trials near the seaward end of the Altenfjord, and many of her crew were on deck, getting ready to cast off. From the bridge, Captain Meyer sounded 'Action Stations', and the flak crews ran to their posts, while the order was given to start releasing the smoke screen. By then, though, it was too late. The British aircraft were upon them. As his Barracudas lined up to start their dive-bombing run, Baker-Falkner gave the order 'All fighters – anti-flak'. So, while the Corsairs stayed aloft, watching out for the Luftwaffe fighters that never appeared, the Wildcats and Hellcats swooped in low, shooting up anything they could find.

The Wildcats of 882 Squadron led the way, dropping down over the hills to fly up the fjord in a straggling line abreast, guns blazing. It was 0528hrs. The bullets from their 50-calibre Browning machine guns tore into the German sailors, trying to find cover on the battleship's exposed upper decks. The other fighters followed, and within seconds *Tirpitz* resembled a charnel house. However, this was only the start. A minute behind them, at 0529hrs, the first of the Barracudas began their attack. They swooped down towards the target in a ragged line, two or three planes wide. Most of the pilots were new to the job, even though the strike leader was an old hand and a veteran of the Taranto raid. So, while the official dive angle was 45 degrees, most left it a little late to start their dive from 10,000ft, and so had to dive more steeply. At 65 degrees, a dive steeper than the Barracuda was really designed for, a few pilots experienced a negative g-force, which made their job even harder.

The prescribed release height for the 1,600lb bombs was 3,500ft, but in the excitement most of the inexperienced crews held on a little longer, and most bombs were dropped from about 2,500ft. As soon as they released their ordnance, the Barracudas would bank, then try to dodge the flak which was now flying around them. Bombs of various sizes were hitting the *Tirpitz*, which soon became shrouded in smoke and flame. The dive bombers behind the first had to aim into the middle of what looked like a blazing inferno. Most crews watched as their bombs hurled down into this, but fresh explosions and flashes suggested they'd scored hits. As Baker-Falkner led his aircraft through a gap in the hills on the north-west side of the Kaafjord, he glanced at his watch. The attack had lasted exactly one minute.

During the strike, some of the air crew had noticed columns of white smoke rising from the shore. These were the smoke screen generators, started up too late to make any difference. However, the blanket would be in place by the time the next wave arrived over the ship. As the last flak guns fell silent the crew of the *Tirpitz* began to take stock. The attack had taken them

completely by surprise, so only a few of the ship's flak guns had been able to open fire before the attackers had gone. Those that had done so had quickly run out of ammunition, as the handlers bringing fresh rounds forward were either hit or unable to bring them up from below decks. Both the strafing and the bombs had hit these flak crews badly, as well as the sailors on the exposed forecastle and quarterdeck, preparing to unmoor ship. Still, those who survived obeyed their orders and pulled their dead companions aside so they could slip the lines. That at least allowed the *Tirpitz* to manoeuvre before any more planes arrived.



Barracudas returning from their strike on the *Tirpitz* on 3 April 1944, photographed from the deck of the fleet carrier *Furious*. In the distance is the *Victorious*, with both carriers preparing to land their aircraft. This was done one plane at a time, with the deck crews having to clear it away before the next Barracuda made its approach. Priority was given to damaged aircraft.

Meanwhile, the second wave had taken off. The first Barracudas flew off from *Furious* and *Victorious* at 0525hrs – just as the first wave were approaching the target. The launch hadn't been straightforward – one plane from 829 Squadron remained behind with engine trouble, while another crashed into the sea just after take-off and its three-man crew were killed. That left 19 Barracudas in the strike, and these formed up as before, with the Corsairs from *Victorious* circling above them and the smaller fighters forming up on either side of the dive bombers. As they crossed the coast at Loppa they saw a column of black smoke ahead of them. It was the *Tirpitz* burning, 40 miles and 12 minutes' flying time away. On the way the strike commander, Lieutenant Commander Rance, ordered each squadron to form into its own column. He knew the flak crews would be fully alerted, so he planned to offer a less conspicuous target for the flak gunners to aim at.

Operation *Tungsten*

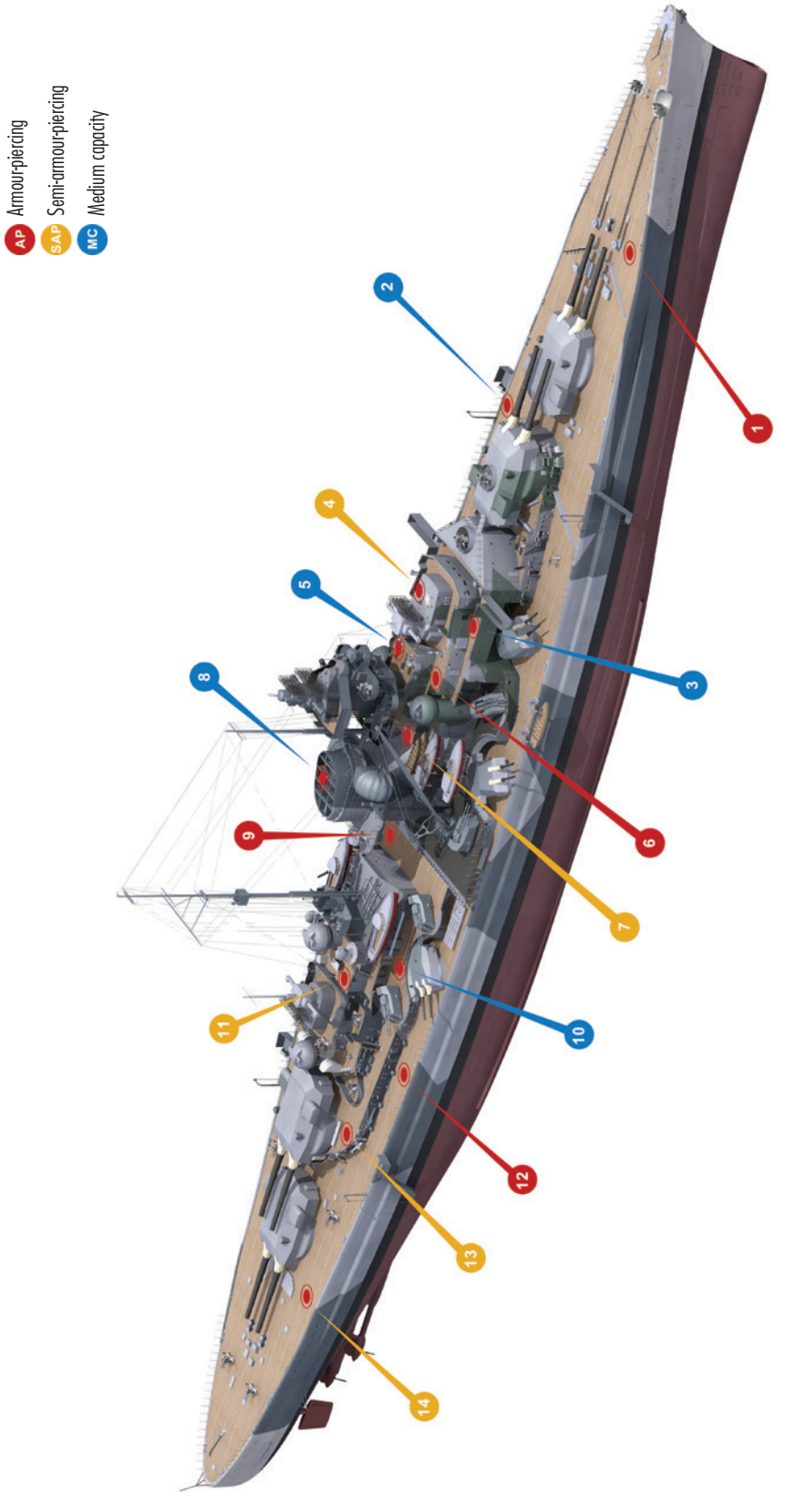
Force 7 (Rear Admiral Bisset, flying flag in *Royalist*)
Fleet carriers (2×): *Furious*, *Victorious*
Escort carriers (4×): *Searcher*, *Pursuer*, *Emperor*, *Fencer*
Light cruisers (2×): *Royalist* (flag), *Belfast*
Destroyers (6×): *Marne*, *Matchless*, *Meteor*, *Milne*, *Ursa*, *Undaunted*

First strike
8 TBR Wing: 12× Barracudas (827 Squadron) from *Victorious* (two with 1× 1,600lb AP, eight with 3× 500lb MCs, two with 2× 600lb ASs); 9× Barracudas (830 Squadron) from *Furious* (five with 1× 1,600lb AP, four with 3× 500lb SAPs)
11× Corsairs (1834 Squadron) from *Victorious*
10× Hellcats (800 Squadron) from *Emperor*
10× Wildcats (881 Squadron) from *Pursuer*
10× Wildcats (882 Squadron) from *Searcher*

Second strike
52 TBR Wing: 11× Barracudas (829 Squadron) from *Victorious** (four with 1× 1,600lb AP, four with 3× 500lb SAPs, three with 500lb MCs); 8× Barracudas (821 Squadron) from *Furious*** (all with 3× 500lb SAPs)
10× Corsairs (1836 Squadron) from *Victorious*
10× Hellcats (804 Squadron) from *Emperor*
10× Wildcats (896 Squadron) from *Pursuer*
9× Wildcats (896 Squadron) from *Searcher*
* There were originally 12× Barracudas in the wave, but one failed to take off due to engine failure.
** There were originally 9× Barracudas in the wave, but one crashed in the sea on take-off, killing its three-man crew.

Combat Air Patrol (CAP)
9× Seafires (801 Squadron) from *Furious*
9× Seafires (802 Squadron) from *Furious*
8× Wildcats (842 Squadron) from *Fencer*

Anti-Submarine Patrol (ASP)
12× Swordfish (842 Squadron) from *Fencer*


Armour-piercing
AP
Semi-armour-piercing
SAP
Medium capacity
MC
1
2
3
4
5
6
7
8
9
10
11
12
13
14

OPPOSITE DAMAGE INFLICTED DURING OPERATION *TUNGSTEN*

This diagram is based on the Fleet Air Arm assessment of damage inflicted on *Tirpitz* during Operation *Tungsten* (3 April 1944), compiled a day after the attack. It replaced an earlier more optimistic account sent to the Admiralty immediately after the completion of the operation. In addition, considerable fire damage was reported in four locations – abaft 'Bruno' turret, around 'Caesar' turret and in the vicinities of secondary turrets PII and SIII.

First wave

A 1,600lb AP hit on starboard side of forecastle, forward of 'Anton' turret (**1**)
A 1,600lb AP hit on port side of catapult deck (**9**)
A 600lb AS (MC) hit on the funnel (**8**) [initially placed to port of funnel]
A 500lb SAP hit on the bridge (**4**) [initially placed starboard side of catapult deck]
One or two 500lb MC hits on port side of 'Bruno' turret (**2**)
A probable 500lb SAP hit on port side of after superstructure (**11**) [initially placed on catapult deck]
A probable 500lb SAP hit on starboard side of boat deck (**7**) [initially placed on catapult deck]
A probable 1,600lb AP hit on starboard side of foremast (**6**) [initially placed on catapult deck]

Second wave

A 1,600lb AP hit on starboard of after superstructure (**12**) [initially placed on hanger]
One or two 500lb MC hits on starboard beam, just inboard of SIII secondary turret (**10**)
A probable 500lb SAP hit on starboard side of quarterdeck (**14**)
A probable 500lb SAP hit on starboard side of 'Caesar' turret (**13**)
A probable 500lb MC hit on secondary turret SI (**3**)
A probable 500lb MC hit immediately forward of foremast (**5**)

In fact, despite the downgrading of the initial damage assessment, only three 1,600lb AP bombs hit the ship, at locations (**1**), (**6**), (**9**), and (**12**), as well as five 500lb SAP bombs at (**4**), (**7**), (**11**), (**13**), and (**14**) and four 500lb MC bombs at (**2**), (**3**), (**5**), (**8**), and (**10**). However, several near misses caused most of the flooding suffered by the battleship during the attack.

Once again, on reaching the Kaafjord from the north the Hellcats and Wildcats went in first, the former strafing the flak batteries along the north-western side of the fjord, while the Wildcats targeted the battleship herself. Rance noticed that the heavier flak batteries were setting their shells to burst at 3,000ft, but by then most of the Barracudas had dived through it and had released their bombs. By now the *Tirpitz* was manoeuvring slowly in the fjord, and when the second wave appeared she was lying across it, so that her starboard flak guns had a clear field of fire up the fjord. However, the air crews described her fire as light – they had more problems from the flak batteries on the shore. One Barracuda was shot down though – a plane from 829 Squadron, which was hit as it passed over the battleship. It dropped its ordnance, but crashed into the hillside on the south side of the fjord, exploding in a ball of flame. Then the fjord was clear again. Once again the attack had lasted no longer than a minute.

The *Tirpitz* looked a real shambles, with jagged, twisted metal everywhere, bomb holes in the deck, spouting smoke and flame, and everywhere the smell of burning. Below decks there was serious flooding, and the ship was listing slightly to starboard. Still, the damage control parties set to work, and soon the fires were extinguished and the flooding contained or stopped completely. Then the officers took stock. A total of 122 crewmen had been killed during the attack, and another 316 wounded. These included Captain Meyer, who was badly wounded as he watched the first wave attack his ship. His second-in-command, Captain Wolfe Junge, took over, and it was he who manoeuvred the battleship out into the fjord. While the ship looked a scene of disorder, the damage control reports proved encouraging. Much of the damage was largely superficial, and no bombs had penetrated the ship's armoured decks or put her guns out of action. Despite the mess, the *Tirpitz* was still operational.

Barracudas flying over the Altenfjord, on their way to the Kaafjord. During the Fleet Air Arm strikes of 1944, the Barracudas flew in at around 5,000ft, with the escorting Corsairs flying above them. They then dived to 3,500ft or less to release their ordnance – if they could see the *Tirpitz* through her protective smoke screen.

In all, the ship's Chief Engineering Officer reported that she had been hit by 12 bombs, and four near misses had caused further damage. One of these near misses from a 1,600lb bomb had caused most of the flooding, as its blast on hitting the water had ripped a hole in the hull below the waterline. Three of them hit the ship, but failed to penetrate the armoured deck, largely because they were dropped from too low an altitude. This deck was one deck below the upper deck of the ship, and although they had gone through this upper less-well protected deck, smashing up the wardroom and a galley, the ship's armoured citadel remained undamaged. While the other hits from the smaller ordnance had caused extensive damage to the battleship's superstructure and flak defences, none of these was seen as of critical importance. However, with so many of their comrades dead or wounded, the morale of the crew had taken a hefty blow.

Back on board the carriers the air crews felt they'd inflicted more damage than they actually had. The Barracuda crews all reported seeing the battleship on fire and that their bombs had hit her. They reported seeing explosions, smoke and flame, and all the signs of damage. From the radio report from the strike leader, Vice Admiral Bisset concluded in a signal to Forbes and Moore: 'It is certain that *Tirpitz* is badly hit by first strike.' The debrief of the crews confirmed this, and after studying photographs taken during the raid, Bisset concluded that *Tirpitz* had been struck by 17 bombs, including three 1,600lb armour-piercing ones, which landed near the forward superstructure. That evening, he signalled to his two superiors that 'I believe *Tirpitz* to now be useless as a warship.'

On board *Anson*, Moore had planned to send his planes in again the following day. Now, though, he concluded that there was no need to risk the crews, and he called off the attack. By the afternoon of 6 April the carriers returned to Scapa Flow, their arrival cheered by the other ships of the fleet. Celebratory signals arrived from both the King and the Prime Minister. The celebrations were premature. PRU flights over the coming days and weeks revealed that although *Tirpitz* had been badly battered, she was still afloat, and that the damage appeared largely superficial. So, on 13 April, the First Sea Lord, Sir Andrew Cunningham, called both Forbes and Moore and ordered them to carry out another attack. Admiral Fraser was reluctant, as he felt the efforts would be wasted, but eventually he acquiesced, and Moore was ordered to draw up fresh plans.

From *Planet* to *Mascot*

Part of Fraser's reluctance was that he was convinced that if the *Tirpitz* was only lightly damaged after a surprise attack, his naval airmen would have much less chance of success against a fully alerted target. This was particularly true in light of fresh evidence that the Germans were strengthening the anti-aircraft defences around the Kaafjord, and upgrading their chain of coastal radar stations. These were due to be fully operational by the end of June. However, he agreed to let Moore carry out another attack, codenamed Operation *Planet*.

It would use the same carrier force that had participated in *Tungsten*, except this time the escort carrier *Striker* replaced the *Fencer*.

The carriers sailed from Scapa Flow on 21 April, accompanied by Moore in the battleship *Anson*, and a screen of escorts. They reached their flying-off position on 24 April, and the crews prepared to launch the strike shortly before midnight. Then, late that afternoon word reached Moore that the weather had deteriorated over the Altenfjord and any chance of carrying out a successful attack had gone. So, Operation *Planet* was cancelled, and the task force returned south, managing only a small consolation prize of a successful attack on coastal shipping off Bødo, south of Narvik. On 15 May the Home Fleet tried again. This time the attack on the *Tirpitz* was codenamed Operation *Brawn*. The carrier strike against the *Tirpitz* would be carried out by *Furious* and *Victorious*. This time, no escort carriers would take part. In this operation, 28 Barracudas formed the main striking force, escorted by 28 Corsairs, four Seafires and four Wildcats. They took off successfully late in the evening, but as the aircraft reached the Altenfjord they found the whole area was blanketed in low cloud. The strike force was recalled, without even venturing near the Kaafjord.

Just ten days later, on 25 May, Moore and his carriers left Scapa Flow again, and three days later they were in their now familiar launch point to the east of the Altenfjord. This attack, codenamed Operation *Tiger Claw*, was similar to its predecessor in terms of scale, with just *Furious* and *Victorious* involved, but it was similar in outcome too. Once again the strike was cancelled due to bad weather, although this time it happened before the strike was launched, and the carrier group headed south again, its air crews taking out their frustration on coastal convoys near Ålesund.

Undeterred, the Home Fleet decided to launch yet another attack, codenamed Operation *Mascot*, which was scheduled to be carried out in mid-July. This time the meteorologists predicted fair weather and clear skies. In these northern latitudes the summer sun never properly sets, so the operation was timed to take place when the 'midnight sun' was at its lowest. The day before, Admiral Fraser had hauled down his flag as commander of the Home Fleet. His place was taken by his newly promoted deputy, Admiral Moore, who was a staunch advocate of naval air power. As in previous Home Fleet air strikes Moore played a major part in the planning. For Operation *Mascot*, he planned to draw on considerable naval

Operation *Mascot*

Home Fleet (Admiral Moore, flying flag in *Duke of York*)
Fleet carriers (3×): *Formidable*, *Furious*, *Indefatigable*
Battleships (1×): *Duke of York* (flag)
Heavy cruisers (2×): *Devonshire*, *Kent*
Light cruisers (2×): *Bellona*, *Jamaica*
Destroyers (16×): *Burges*, *Bulldog*, *Hoste*, *Inman*, *Marne*, *Matchless*, *Milne*, *Musketeer*, *Nubian*, *Scourge*, *Verulam*, *Vigilant*, *Virago*, *Volage*, plus *Algonquin*, *Sioux* (both Royal Canadian Navy)

Strike aircraft
8 TBR Wing: 12× Barracudas (827 Squadron) from *Formidable* (six with 1× 1,000lb AP, six with 3× 500lb SAPs); 10× Barracudas (830 Squadron) from *Furious* (six with 1× 1,600lb AP, four with 3× 500lb SAPs)
9 TBR Wing 12× Barracudas (820 Squadron) from *Indefatigable* (six with 1× 1,000lb AP, six with 3× 500lb SAPs); 10× Barracudas (826 Squadron) from *Indefatigable* (five with 1× 1,600lb AP, five with 3× 500lb SAPs)
18× Corsairs (1841 Squadron) from *Formidable*
12× Fireflys (1770 Squadron) from *Indefatigable*
18× Hellcats (1840 Squadron) from *Furious*

Combat Air Patrol (CAP)
12× Seafires (880 Squadron) from *Furious*
16× Seafires (894 Squadron) from *Indefatigable*
8× Wildcats (842 Squadron) from *Fencer*

Anti-Submarine Patrol (ASP)
3× Swordfish (842 Squadron) from *Furious*
2× Barracudas (830 Squadron) from *Furious*
2× Barracudas (826 Squadron) from *Indefatigable*

aviation resources, committing three fleet carriers to the operation – *Formidable*, *Furious* and *Indefatigable*. *Victorious* was no longer available, as she had been ordered to the Indian Ocean, so the newly completed *Indefatigable* took her place.

Operation *Mascot* would involve 48 Barracudas, flying from *Formidable* and *Indefatigable*, escorted by 18 Corsairs, 18 Hellcats and 12 Fireflies. Moore would command the fleet from his flagship *Duke of York*, while the carriers were controlled by Rear Admiral Rhoderick McGrigor, flying his flag in the *Indefatigable*. Once again the air crews practised their attacks over Loch Eribol, before the force sailed from Scapa Flow on 14 July. The attack was scheduled for the night of 16/17 July. By the late afternoon of 16 July the task force was in place, a little to the north of its position in previous operations. The Corsairs took off from *Formidable* at midnight, followed by the Barracudas, which were split into two wings. At 0135hrs, the strike force was fully assembled, and it set off towards the *Tirpitz*, flying at 50ft to avoid showing up on radar. There was no sign of enemy aircraft, and for once there was no low cloud to obscure the target.

However, this time, at 0200hrs, the Germans picked up the low-flying strike on their recently improved radar system, and the *Tirpitz* was warned even before the strike reached the coast. Just as importantly, a newly installed set of German electronic stations began jamming the British radio signals. A few minutes later, at 0210hrs, *Tirpitz* began deploying her smoke screen, which had recently been expanded by adding more smoke generators at the top of the heights overlooking the Kaafjord. Also, since *Tungsten* in April, the Germans had installed a mountaintop observation post on the crest of the high ground on the north-western side of the fjord, and it had a direct communications link to the battleship. Not only did this serve as a lookout, reporting on the course, number and height of the approaching planes, but the post also contained a flak direction team.

As for the flak itself, thanks to the arrival of new airburst shells, the *Tirpitz* was able to add the weight of her main and secondary guns to the flak barrage. In all, some 39 38cm flak shells were fired during the attack, as well as another 359 rounds from her secondary 15cm guns. While of limited use save as a deterrent, these larger shells added greatly to the strength of the flak barrage thrown up from the battleship by her dedicated 10.5cm flak guns. In addition her 3.7cm and 20mm guns were sending up streams of tracer, as were the flak batteries lining the fjord. It was into this maelstrom of smoke and fire that the strike aircraft began their attack, at around 0234hrs. As before it was the fighters who led the way, the Hellcats and Fireflies swooping down into the fjord to strafe the battleship and any flak batteries they spotted on the shore. In fact the target was completely obscured by smoke. The best the pilots could do was to fire into the murk. They did, however, manage to strafe the German destroyer *Z-33*, patrolling in the mouth of the Kaafjord, as well as a small patrol boat – a converted trawler – which duly ran aground.

Then, at 0249hrs, the Barracudas began their attack. Once again there was no sign of the battleship, but the dive bombers made their run, in batches of four or six planes at a time. Afterwards, only two pilots claimed they were actually able to see the *Tirpitz* through the smoke. Some air crews avoided releasing their bombs, as they found nothing to aim at, while others released their ordnance in the direction of the flak climbing out of the smoke towards them. All they had to show for their efforts was one near miss. However, other targets presented themselves – one Barracuda released its bombs over a flak position and another made an unsuccessful bombing run on the hapless *Z-33*.

Within 20 minutes it was all over. The planes climbed out of the fjord and headed back to their carriers. Two aircraft were lost during the attack – a Corsair and a Barracuda – but several other dive bombers were damaged, and were lucky to make it back to their ship. The Corsair crashed in the fjord, and the pilot was rescued and captured, while the Barracuda managed to reach the carrier group but was unable to land, and was forced to crash-land in the sea next to the *Indefatigable*. Her crew were rescued by a destroyer. One of the damaged

Corsairs of 1841 Squadron ranged on the deck of HMS *Formidable* being prepared for take-off during Operation *Goodwood*. Each of them carries a long-range fuel tank. Astern of the carrier, the heavy cruiser *Berwick* is deployed as part of the task force screen, providing extra anti-aircraft protection for the carriers.

Hellcats managed to land, but the aircraft was so badly damaged that it was written off, and thrown overboard. Yet again a Fleet Air Arm attack had ended in disappointment. Moore planned to repeat the attack the following morning at 0800hrs. The strike aircraft were actually ranged on deck for this second attack, when the appearance of fog, both around the carriers and in the target area, led to the attack being cancelled.

Tirpitz had survived Operation *Mascot* unscathed, and work continued on repairing the damage suffered during Operation *Tungsten*. Hundreds of civilian workers had cut away her damaged superstructure, repaired her guns, and patched the holes in her deck – often using wood and concrete if nothing else was available. Although her captain described her as fully combat ready, the battleship had never fully recovered from the damage she suffered from Operation *Source*, and more recently from *Tungsten*. At best, she could steam at 20 knots, which meant she could be overhauled by just about every surface warship in the Home Fleet. Still, at the end of July she left her moorings, and ventured out into the mouth of the Altenfjord, where she conducted various exercises, protected by a watchful screen of destroyers. When the Admiralty learned of this they feared that *Tirpitz* was ready to carry out operations again, and so once again she would be a threat to the Arctic Convoys. So, she had to be dealt with. By then, though, the Home Fleet was busy planning an even larger and more sustained operation. This time, the carrier group would keep launching attacks until the job was done.

Operation *Goodwood*

The Arctic Convoys had been suspended since May 1944, due to the coming of the long summer days. War materials were stockpiling in Britain, Canada and the United States, so it was imperative that they should resume in mid-August, when the days were beginning to get shorter again. Despite her reduced abilities the *Tirpitz* remained a potent threat to these convoys, particularly if she sortied under the cover of German aircraft. So the First Sea Lord, Admiral of the Fleet Cunningham, ordered the Commander-in-Chief of the Home Fleet to do what he could to sink the battleship, or at least to neutralize her. As a result, Admiral Moore and his staff set about planning what would become the biggest British carrier operation of the war.

This operation would serve a double purpose. Not only would it deal with the *Tirpitz*, but by putting to sea the Home Fleet could also cover the first Arctic Convoy of the season.

The 34 merchant ships of convoy JW-59 were due to leave Loch Ewe on 15 August, bound for Murmansk. They had a strong escort, including the escort carriers *Striker* and *Vindex*, and the Soviet battleship *Archangelsk* (formerly the British *Royal Sovereign*). However, the powerful carrier strike force could also support the convoy if required. On 18 August, Force 1 left Scapa Flow and headed towards the Arctic Sea. It consisted of Moore's flagship *Duke of York*, the fleet carriers *Formidable*, *Furious* and *Indefatigable*, and a screen of escorts. These were the carriers which had spearheaded Operation *Mascot*. Force 2 accompanied it, a much smaller group centred on the escort carriers *Nabob* and *Trumpeter*. Together, though, these carriers gave Moore the chance to launch an even larger strike than he had done during Operation *Tungsten*.

Just as importantly, Force 9 was also heading north – a group of two fleet tankers and their escorts, which gave Moore the ability to linger on station for several days. This reduced the risk of the whole operation being cancelled due to bad weather, and also allowed Moore to carry out flying operations for up to nine days. This meant that more than one strike against the *Tirpitz* could be attempted. On the evening of 20 August the carriers arrived at their flying-off position to the north-west of the Altenfjord, and as far as Moore could tell, their presence hadn't been detected. The first strike was scheduled for the following morning. However, bad weather intervened and the attack was postponed for a day. Moore used the opportunity to refuel his screen of destroyers and frigates, so that they could remain on station.

The plan was to carry out the strike with the Barracudas armed with a single 11,600lb AP bomb apiece. As in previous operations the Corsairs would provide 'top cover', along with the Fireflies and a squadron of Seafires. This time, though, the Corsairs also carried 500lb bombs, so they could dive-bomb the target if the opportunity arose. The Hellcats would provide close escort, but carried 500lb bombs as well. Meanwhile other Barracudas would fly on anti-submarine patrols around the task force, while Seafires and Wildcats would screen it from enemy air attacks. The large number of Seafires carried showed just how serious a threat

Operation *Goodwood*

Home Fleet
Commander-in-chief: Admiral Moore, in *Duke of York*
Second-in-command: Vice Admiral McGrigor, in *Indefatigable*
Force 1
Battleships (1×): *Duke of York* (flag)
Fleet carriers (3×): *Formidable*, *Furious*, *Indefatigable*
Heavy cruisers (2×): *Berwick*, *Devonshire*
Destroyers (14×): *Cambrian*, *Myngs* (flotilla leader), *Scorpion*, *Scourge*, *Serapis*, *Verulam*, *Vigilant*, *Virago*, *Volage*, *Whirlwind*, *Wrangler*, *Stord* (Royal Norwegian Navy), *Algonquin*, *Sioux* (both Royal Canadian Navy)
Force 2
Escort carriers (2×): *Nabob*, *Trumpeter*
Heavy cruisers (1×): *Kent*
Frigates (6×): *Aylmer*, *Bickerton*, *Bligh*, *Grindall*, *Keats*, *Kempthorne* (all 5th Escort Group)
Force 9
Destroyer (1×): *Nubian*
Corvettes (3×): *Poppy*, *Dianella*, *Starwort*
Fleet oilers (2×): *Black Ranger*, *Blue Ranger*
Air assets
12× Barracudas (827 Squadron) from *Furious*
12× Barracudas (820 Squadron) from *Indefatigable*
12× Barracudas (826 Squadron) from *Formidable*
12× Barracudas (828 Squadron) from *Formidable*
18× Corsairs (1841 Squadron) from *Formidable*
12× Corsairs (1842 Squadron) from *Formidable*
12× Hellcats (1840 Squadron) from *Indefatigable*
8× Avengers (846 Squadron) from *Trumpeter*
12× Avengers (852 Squadron) from *Nabob*
6× Wildcats (846 Squadron) from *Trumpeter*
4× Wildcats (852 Squadron) from *Nabob*
12× Fireflies (1770 Squadron) from *Indefatigable*
12× Seafires (801 Squadron) from *Furious*
12× Seafires (880 Squadron) from *Furious*
16× Seafires (887 Squadron) from *Indefatigable*
16× Seafires (894 Squadron) from *Indefatigable*

Moore considered the German bombers to be. Finally, the Avengers carried in the escort carriers would drop mines in the Kaafjord to seal the *Tirpitz* off from the sea.

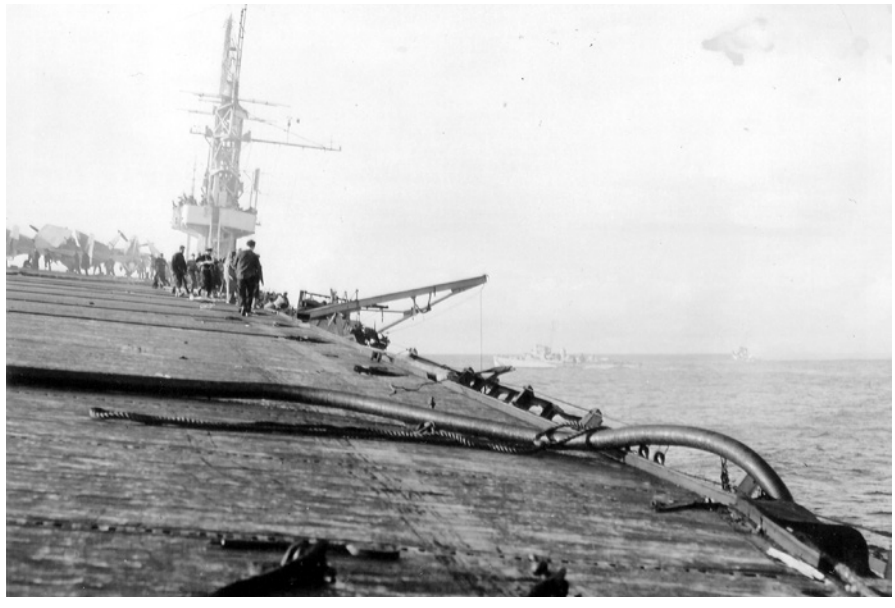
At 0530hrs on 22 August, with the promise of better flying conditions to come, Moore made the decision to launch the strike at 0830hrs that morning. However, the continued bad weather led to a postponement, and it was 1100hrs when the Corsairs took off from *Formidable* and climbed above the carriers. The rest followed, and by 1150hrs the strike force was on its way to its target. It consisted of 31 Barracudas, drawn from all four squadrons, as well as 24 Corsairs, 11 Fireflies, nine Hellcats and eight Seafires. The Avengers were left behind on the escort carriers, as there were only enough mines for one operation. As the planes couldn't land with them if the sortie was aborted, and would have to ditch them in the sea, Moore decided to wait for better flying conditions before he used them. The strike force flew towards the coast at 500ft, and only started to climb to 10,000ft when it got within 15 miles of the coast.

However, the Norwegian coast ahead of them was blanketed in a thick low cloud, at 1,500ft. This meant it would be impossible to carry out a successful dive bombing, so the strike leader, Lieutenant Commander West, ordered the Barracudas and Corsairs to return to the carriers. The fighters pressed on, though, seeking out targets to attack. The Seafires strafed Banak airfield and a nearby seaplane base, the Fireflies did the same to flak positions around the Kaafjord, while at 1249hrs the Hellcats attacked the *Tirpitz*. The Germans were taken by surprise, so at first flak was relatively light. One Hellcat claimed to have hit the battleship just behind her forward superstructure, but otherwise she was unscathed. One of the Hellcats was shot down in the attack, as was a Seafire as it flew over Kolvik seaplane base. The only other loss of the strike was a Barracuda from 827 Squadron, which messed up its landing back on *Furious* and ended up ditching in the sea, from where its crew were rescued by a destroyer.

This attack, known later as '*Goodwood I*', was in line with Moore's tactic of carrying out 'teasing tactics' if the weather precluded the launch of a full-scale strike. It was repeated that evening, when in a sortie grandly known as '*Goodwood II*', six Hellcats and eight Fireflies from *Indefatigable* took off at 1830hrs, heading back towards the *Tirpitz*. Once again the Hellcats carried 500lb SAP bombs. They appeared over the Kaafjord at 1910hrs, and once more the low-flying fighters took the crew of the battleship by surprise. When they appeared the smoke screen still hadn't been deployed. Flying conditions were good, but still none of the bombs hit the ship. The fighters shot up other targets of opportunity on the way back up the Altenfjord, and all aircraft returned safely.

So far, *Goodwood* had cost Moore three aircraft, but this was partly mitigated by the fact that the Seafires patrolling over the task force had shot down two German reconnaissance flying boats. Much more serious was the operational loss of the escort carrier *Nabob*. The task force had been sighted by *U-354*, a Type VIIC U-boat commanded by Lieutenant Commander Sthamer. That afternoon, Moore detached *Formidable* and *Furious* to refuel from his fleet tankers, which were over the horizon to the west. He also sent Force 2 westwards, to refuel their escorts from their own fuel tanks. This unwittingly brought them within range of the U-boat, whose spread of torpedoes launched at 1755hrs hit the escort carrier *Nabob* and the frigate *Bickerton*. While the other escorts chased Sthamer, the crew of the *Nabob* fought to save her. Eventually, she limped off, protected by a screen of escorts. The stricken *Bickerton*, though, was a complete wreck, and had to be scuttled. This deprived Moore of the ability to launch his mine-carrying Avengers, so that part of the plan had to be abandoned. He probably found some consolation in the news that two days later *U-354* was sunk with all hands by depth charges dropped from a Swordfish operating from the escort carrier *Vindex*.

Nabob limped south towards Scapa Flow, protected by the rest of Force 2. Moore ordered his fleet carriers to regroup, and in the meantime, with one carrier at his disposal, he planned to launch another 'teasing attack' the following day. By dawn on 23 August both *Formidable*



On 22 August, during Operation *Goodwood*, the escort carrier *Nabob* was torpedoed by the German U-boat *U-354*. Ironically, *Nabob* was attached to the carrier group in order to provide anti-submarine air patrols. Despite listing to port and down by the stern the carrier made it back to Scapa Flow under her own steam, before being towed to Rosyth for repairs.

and *Furious* were still absent, so the attack would go ahead with just the Hellcats, Fireflies and Seafires from *Indefatigable*. Once again, however, bad weather led to the cancellation of the strike, as fog blanketed the area. Still, this allowed the detached carriers to rejoin the fleet, and so, in hope of better weather to come, Moore and his staff spent the day planning for a full-scale attack to be launched the following morning.

As dawn broke on 24 August it was clear that flying was still impossible. So the crews waited, until at 1330hrs Moore gave the order to go ahead. An hour later, at 1430hrs, the first of the strikes began taking off from the three carriers; '*Goodwood III*' was under way. This time 33 Barracudas formed the heart of the strike, made up from all four squadrons. Each carried a single 1,600lb AP bomb. The remaining operational Barracudas were deployed on anti-submarine patrol. Of the 24 Corsairs in the strike, five carried 1,100lb APs, while each of the ten Hellcats was armed with 500lb APs. Ten Fireflies provided dedicated 'top cover', as this time the Corsairs were ordered to peel off over the Kaafjord and attack targets of opportunity. In addition, eight Seafires took off to 'shoot up' Banak airfield, while others formed a combat air patrol over the task force. Conditions that afternoon were near perfect, and the air crews flying in at 500ft were able to see the coast from 60 miles away.

This time the German radar operators saw them coming, even before they climbed to their bombing height on reaching the coast. At 1541hrs the *Tirpitz* sounded her air attack warning, and as her crew scrambled to man their guns the smoke screen generators got to work. Meanwhile, as the strike aircraft flew over the Langfjord they came under attack from the flak guns of the destroyers anchored there. Over the Kaafjord the Germans were throwing up a strong box barrage at 3,000–4,000ft, but this diminished slightly when the fighters swooped in to attack the flak positions on the shore. It was now 1559hrs, and the Hellcats peeled off to attack the battleship. By now, however, she was completely obscured by smoke. Despite the heavy flak many of the pilots circled round for another bombing run, before making way for the Barracudas. All they had to show for it was one hit on the battleship's 'Bruno' turret. One Hellcat was lost during this attack, while a second Hellcat would go down while attacking a wireless station on the shore some ten minutes later.

Behind them came the five bomb-armed Corsairs, one of which mistakenly claimed a hit on the battleship with its 500lb bomb. Three of the five, though, were shot down, while a fourth was so badly damaged that it had to ditch next to *Formidable* after making it back to

the task force. Behind the Corsairs the Barracudas were starting their attack. Again, almost none of the crewmen could actually see their target, and were reduced to aiming at the source of the tracer coming towards them through the smoke. The 33 Barracudas attacked in waves of five or six aircraft, and virtually all the pilots released their bombs from a height of around 4,000ft, well above the smoke and the box barrage exploding beneath them. They had to dive through it, however, and several of the aircraft were hit. One 1,600lb bomb struck the port side of *Tirpitz*, near the side of her bridge, but otherwise none of the bombs hit their target, thanks to the impenetrable smoke.

On the way home the strike aircraft attacked any targets they came across, from flak positions to patrol boats, destroyers and flak ships. Apart from the Hellcat that crashed during this phase, and the Corsair that ditched next to its carrier, all of the other surviving aircraft made it back. Many of the Barracudas were badly battered, though, and would have to be patched up before they could fly again. After the sortie, Moore counted the cost. He had lost six aircraft over the Altenfjord, and one more while landing on. In exchange he had reduced the flak defences surrounding the anchorage and scored two hits on the battleship. Of these, the 1,600lb bomb had pierced five decks, but failed to explode. The 500lb bomb dropped by a Hellcat had demolished the quadruple flak gun mounted on the top of 'Bruno' turret, but otherwise had inflicted no other damage. In all, *Tirpitz* had lost eight men dead and 18 wounded in the attack.

After the operation it was clear that the elderly *Furious* was suffering mechanical problems and running low on fuel, so she was detached early on 25 August. Moore took part of Force 1 over to the Faroes to refuel, while the carriers and their escorts did the same from the Force 9 fleet tankers. At 0300hrs on 29 August, the two parts of Force 1 were reunited 250 nautical miles west of the Altenfjord. They steamed inshore during the night, and by noon they had reached their old launching position, 80 nautical miles off the coast. The weather looked unpromising, but conditions soon improved, and at 1530hrs '*Goodwood IV*' began as the first aircraft took off from Moore's two remaining carriers, *Formidable* and *Indefatigable*. Twenty-five minutes later, after forming up, they set off towards the Kaafjord.

This time the strike force was made up of 26 Barracudas, each carrying a single 1,600lb AP bomb. Two Corsairs carried single 1,000lb APs, while three Hellcats were equipped with 500lb APs. Four other Hellcats equipped with target indication flares and 15 more

Operation *Goodwood III*, Kaafjord, 24 August 1944

On 18 August 1944 a British carrier force left Scapa Flow bound for the waters off the Altenfjord. There they launched the first of a series of naval air strikes against the *Tirpitz*, which was moored in the Kaafjord. This undertaking, codenamed Operation *Goodwood*, involved the launching of coordinated strikes from five aircraft carriers, supported by a screen of fighters. The first two strikes, *Goodwood I* and *Goodwood II*, were launched on 22 August, but low cloud hampered the first strike, while the second was little more than a small-scale bombing and strafing attack, carried out by Fireflies and Hellcats.

Two days later, on 24 August, the Fleet Air Arm tried again. This time weather conditions were more favourable, and a strike of 33 Barracuda dive bombers took off. Preceding them were five Corsair and ten Hellcat fighters carrying smaller bombs, while fighter cover was provided by 19 Corsairs and ten Fireflies. The attack began at 1559hrs DBST, as the fast bomb-armed fighters made their run, attacking at low level. By then, though, the *Tirpitz* was wreathed by her protective smoke screen, and by the time the first Barracudas arrived, the battleship was hidden by the smoke. Still, the attack went ahead as planned, with each wave of five or six Barracudas diving from 5,000ft to release their 1,600lb AP bombs at the spot where their crews thought the battleship lay.

The bombers had to dive through a heavy layer of flak, and many aimed at the source of the tracer from light anti-aircraft guns, emerging through the white smoke. However, only two bombs hit the *Tirpitz* during the attack. Several Barracudas were damaged, but miraculously none were shot down during the attack. Nevertheless, the effectiveness of *Tirpitz*'s smoke screen demonstrably showed that this sort of attack was unlikely to succeed. So, after one more attempt the operation was called off, and the Admiralty were forced to ask Bomber Command for their help in sinking the German battleship.

Jim Laurier

Corsairs flew as escorts, together with ten Fireflies. Seven more Seafires also took off to cause a diversion, by shooting up coastal shipping off Hammerfest. The aircraft were detected by German radar at 1640hrs, and thanks to a strong wind the strike made landfall some miles to the south of their usual spot over Loppa. For once they were approaching the *Tirpitz* from the south-west, rather than the west. Actually, this made almost no difference. The smoke screen was deployed long before the first aircraft appeared over the Kaafjord, and once more the air crews were attacking a target they couldn't see. The innovation of using four Hellcats to drop coloured smoke flares would have helped the dive bombers to identify the target, but by the time they arrived the *Tirpitz* was completely obscured.

At 1702hrs the bomb-armed Hellcats and Corsairs made their run, but all five bombs missed their target. Happy that no enemy fighters were in the area, the rest of the fighter escort and the flare-carrying Hellcats dropped down into the smoke to strafe the hidden battleship as best they could, or shoot up flak positions along the edge of the fjord. Then, 15 minutes later, the Barracudas began their attack, having formed a column several aircraft wide. They dropped their bombs from 3,500ft or above, and some kept diving until they were swallowed up by the thick white smoke. While the crews later claimed a score of two hits, in fact the *Tirpitz* emerged completely unscathed. This time a Corsair and a Firefly were shot down over the Kaafjord as they made their strafing run. Two more badly shot-up Barracudas made it back to their carriers, but were so badly damaged that they were ditched over the side.

Wing Commander J. B. Willy Tait DSO DFC (1916–2007) was the commanding officer of 617 Squadron, and the leader of the three Lancaster missions against the *Tirpitz* in 1944 – Operations *Paravane*, *Obviate* and *Catechism*. In all he flew over a hundred bombing missions during the war, but he is best remembered as the man responsible for the sinking of the *Tirpitz*.

On board the *Tirpitz*, the only material effect of these four Operation *Goodwood* attacks, apart from the loss of a handful of her crew, was the damage caused by an equally small number of bomb hits, the most serious of which was from a 1,600lb bomb that failed to explode. This damage, though, was easily patched. Less easy to replace was the ammunition she had expended. During the attacks she had fired off a total of 201 rounds from her 38cm main guns, 1,141 rounds from her 15cm secondary guns, and roughly 60 per cent of her smaller-calibre anti-aircraft rounds. In the late summer of 1944, as Allied tanks were racing through France towards the German border, the chances of replenishing all this ordnance looked slim.

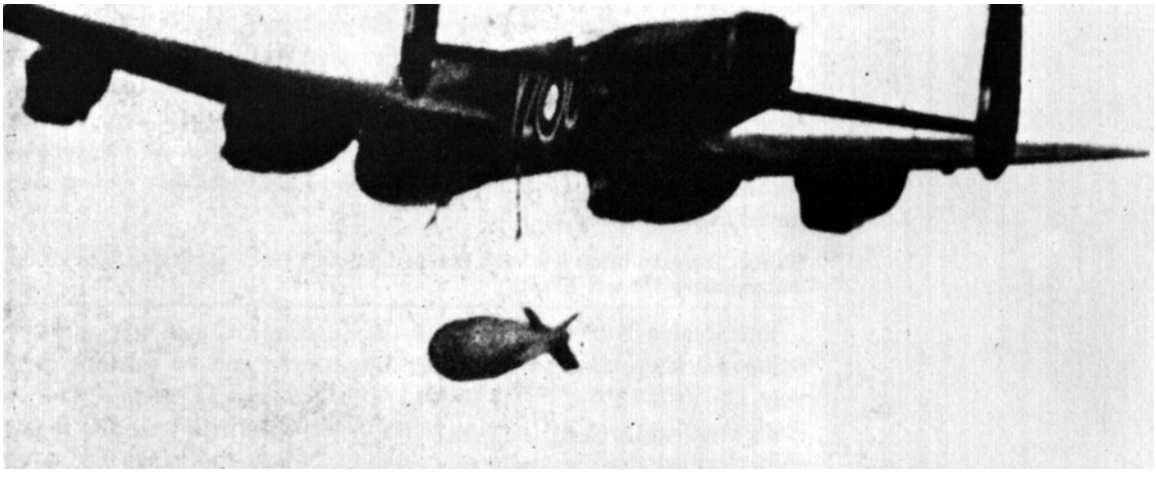
After recovering their aircraft the carriers returned to Scapa Flow with an escort, while the rest of the Home Fleet set off to cover the transit of another Arctic Convoy, this time the homeward-bound RA-59. Moore's force finally reached its base in Orkney on 3 September. It was there that the Home Fleet's commander learned from Ultra signal intercepts that the damage of these raids on the German battleship had been negligible. So, gallant though it undoubtedly was, the Fleet Air Arm offensive against the *Tirpitz* had been a failure. *Tirpitz* still remained a threat to the Arctic Convoys, and by now it was clear that the Royal Navy lacked the ordnance needed to deal with her. It was now up to the RAF to take up the torch, and to deal the knock-out blow.

The Tallboy raids

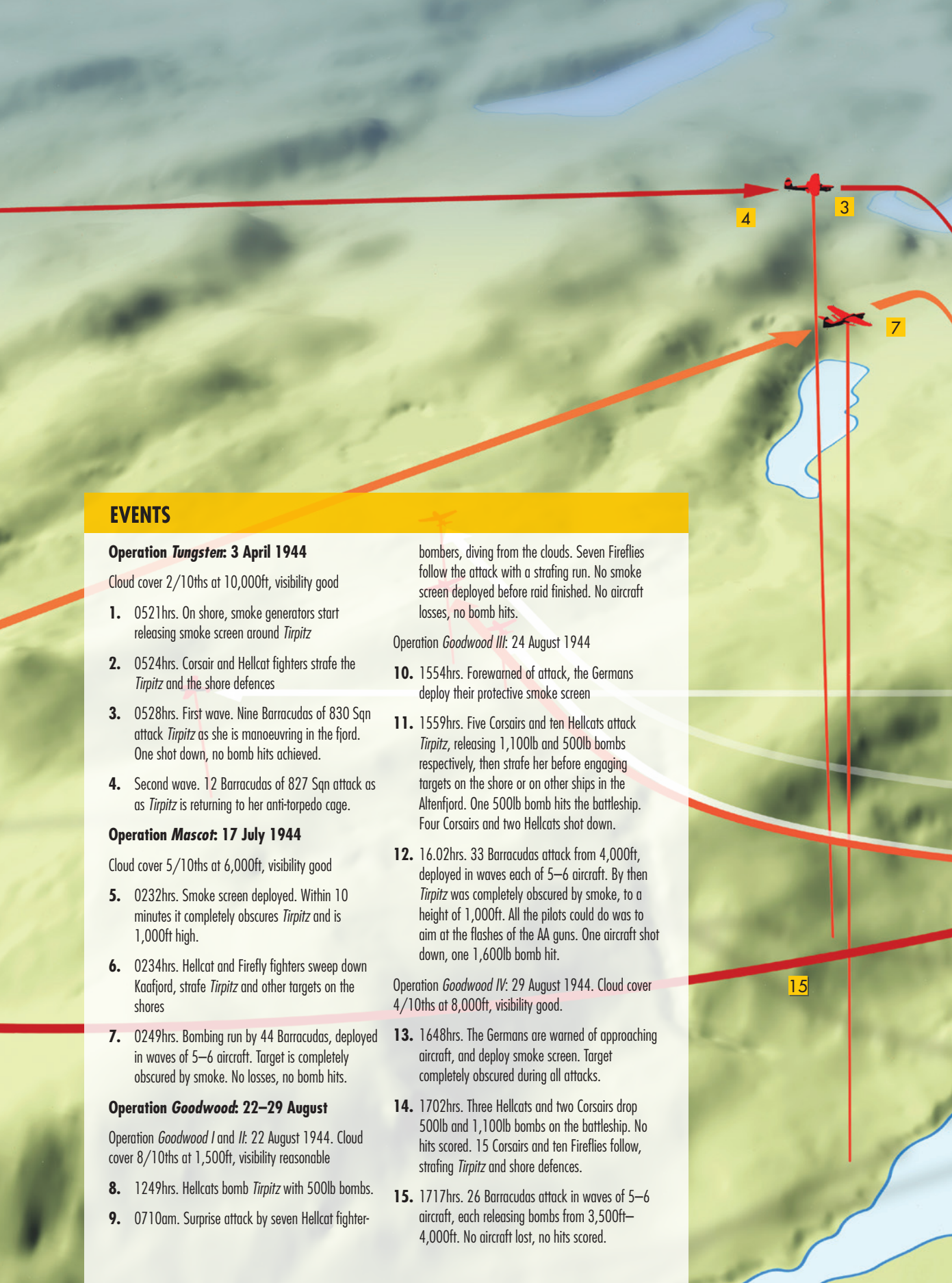
Operation *Paravane*

Various alternatives were now considered. These included using fast twin-engined Mosquitos to attack the ship, launched from the Home Fleet's carriers. It was felt that they would be fast enough to confound the enemy's smoke screen and so have a clear run at the *Tirpitz*. However, they were all needed in the main theatre of war, so the use of them was denied. So too was another request to use American B-17 bombers, flying from Soviet airfields. They were required for the round-the-clock bombing of targets in Germany. So it fell to Bomber Command to do the job. That meant using the Lancaster.

Fortunately, since Bomber Command's last attempt on *Tirpitz*, new ordnance had been introduced which was particularly well suited to the task. These 'JW' bombs were mine-bombs designed to repeatedly rise and sink while moving laterally through the water. When they made contact with the underside of a ship they would explode. While this was ingenious, a much more effective piece of ordnance was the newly introduced 'Tallboy'. When dropped over land, this highly aerodynamic, hardened-steel 12,000lb bomb reached a supersonic



This rare photograph shows a 12,000lb Tallboy bomb being dropped from a Lancaster of 617 Squadron during a training exercise in August 1944, before the squadron carried out its three attacks on the *Tirpitz*. Thanks to a new precision bomb-aiming device, a high degree of accuracy could be assured, if only the aimer could see the target prior to the bomb's release.



EVENTS

Operation *Tungsten*: 3 April 1944

Cloud cover 2/10ths at 10,000ft, visibility good

1. 0521hrs. On shore, smoke generators start releasing smoke screen around *Tirpitz*

2. 0524hrs. Corsair and Hellcat fighters strafe the *Tirpitz* and the shore defences

3. 0528hrs. First wave. Nine Barracudas of 830 Sqn attack *Tirpitz* as she is manoeuvring in the fjord. One shot down, no bomb hits achieved.

4. Second wave. 12 Barracudas of 827 Sqn attack as as *Tirpitz* is returning to her anti-torpedo cage.

Operation *Mascot*: 17 July 1944

Cloud cover 5/10ths at 6,000ft, visibility good

5. 0232hrs. Smoke screen deployed. Within 10 minutes it completely obscures *Tirpitz* and is 1,000ft high.

6. 0234hrs. Hellcat and Firefly fighters sweep down Kaafjord, strafe *Tirpitz* and other targets on the shores

7. 0249hrs. Bombing run by 44 Barracudas, deployed in waves of 5–6 aircraft. Target is completely obscured by smoke. No losses, no bomb hits.

Operation *Goodwood*: 22–29 August

Operation *Goodwood I* and *II*: 22 August 1944. Cloud cover 8/10ths at 1,500ft, visibility reasonable

8. 1249hrs. Hellcats bomb *Tirpitz* with 500lb bombs.

9. 0710am. Surprise attack by seven Hellcat fighter-bombers, diving from the clouds. Seven Fireflies follow the attack with a strafing run. No smoke screen deployed before raid finished. No aircraft losses, no bomb hits.

Operation *Goodwood III*: 24 August 1944

10. 1554hrs. Forewarned of attack, the Germans deploy their protective smoke screen

11. 1559hrs. Five Corsairs and ten Hellcats attack *Tirpitz*, releasing 1,100lb and 500lb bombs respectively, then strafe her before engaging targets on the shore or on other ships in the Altenfjord. One 500lb bomb hits the battleship. Four Corsairs and two Hellcats shot down.

12. 16.02hrs. 33 Barracudas attack from 4,000ft, deployed in waves each of 5–6 aircraft. By then *Tirpitz* was completely obscured by smoke, to a height of 1,000ft. All the pilots could do was to aim at the flashes of the AA guns. One aircraft shot down, one 1,600lb bomb hit.

Operation *Goodwood IV*: 29 August 1944. Cloud cover 4/10ths at 8,000ft, visibility good.

13. 1648hrs. The Germans are warned of approaching aircraft, and deploy smoke screen. Target completely obscured during all attacks.

14. 1702hrs. Three Hellcats and two Corsairs drop 500lb and 1,100lb bombs on the battleship. No hits scored. 15 Corsairs and ten Fireflies follow, strafing *Tirpitz* and shore defences.

15. 1717hrs. 26 Barracudas attack in waves of 5–6 aircraft, each releasing bombs from 3,500ft–4,000ft. No aircraft lost, no hits scored.

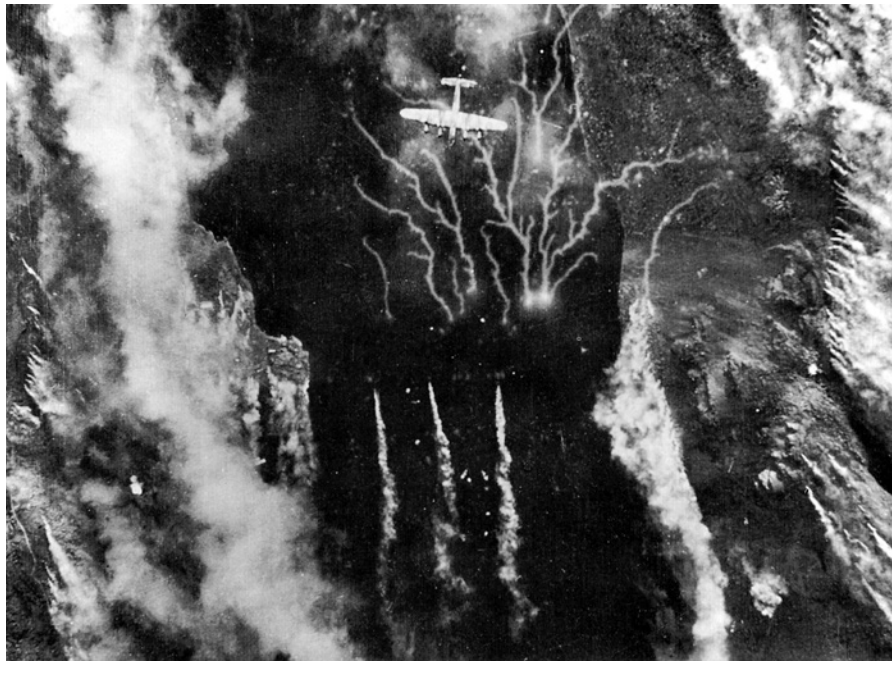
Fleet Air Arm attacks
Kaafjord, April–August 1944
12
11
8
9
14
6
A
B
13
10
5
1
2
Kaafjord
TIRPITZ ANCHORAGES
A. Tirpitz summer anchorage
B. Tirpitz winter anchorage
KEY
Smoke generators
AA guns
Anti-torpedo nets

terminal velocity, could penetrate up to 16ft of concrete and produced its own earthquake when it then exploded underground. It had already proved its worth in attacks on German rocket sites, and it was felt that it could be equally effective if dropped on a battleship.

Bomber Command realised that the Altenfjord was beyond the range of Lancasters operating from air bases in north-eastern Scotland. So it was decided to fly a bomber force to the Soviet Union, and base it in an airfield near Archangel. From there the bombers could reach their target if they were modified slightly with additional fuel tanks and the removal of their upper gun turret. Better still, by approaching the Kaafjord from the east, it was hoped that the attackers would avoid being detected by the German radar stations until it was too late to deploy the smoke screen over the Kaafjord.

The obvious choice for this operation was 617 Squadron ('the Dambusters'), commanded by Wing Commander 'Willy' Tait, based in Woodhall Spa in Lincolnshire. Their Lancasters had been converted to use the Tallboy, and the crews were used to unusual missions. Accompanying them would be 9 Squadron, commanded by Wing Commander Bazin, based in nearby Bardney. Their bombers could also accommodate the new bomb. In late August, 5 Group of Bomber Command were ordered to draw up plans for the attack, codenamed Operation *Paravane*.

Early on, it was decided that a Soviet airfield should be used. The original idea was to fly to forward bases in north-east Scotland, then bomb the *Tirpitz* before heading east to land on an airfield in northern Russia. However, the high risk of bad weather over the Altenfjord meant that this scheme was shelved on 11 September. Instead, the bombers would fly to Yagodnik airfield near Archangel, and launch their attack from there. The airfield lay in an island in the Dvina River, 12 miles south-west of Archangel and 610 miles from the Kaafjord. The only problem was getting there. At 1900hrs on 12 September, 18 fully armed Lancasters of 9 Squadron took off from Barney, accompanied by two Liberators carrying spare parts and ground crew, a Lancaster from 463 Squadron which was there to film the operation and a PRU Mosquito, to check that the *Tirpitz* was still where it was supposed to be. Another 20 Lancasters from 617 Squadron also took off from Woodhall Spa. The operation was under way.



This image was taken from a Lancaster carrying a film crew on 15 September 1944. Taken from about 20,000ft, it shows the opening stages of Operation *Paravane*, when *Tirpitz* was attacked in the Kaafjord by Lancaster bombers carrying Tallboys and JW mines. The bomber in the picture, part of 'Force A', is flying at approximately 15,000ft, flying up the fjord towards the battleship, having already released its Tallboy. The German smoke screen is already thickening, and beginning to obscure the target, which is just off the top edge of the photograph.

Air Vice Marshal Ralph Cochrane (1895–1977), the Scottish-born commander of the RAF's No. 5 Group, championed the use of his bomber squadrons in specialist precision attacks. The most famous of these was the Dambuster Raid of May 1943, carried out by 617 Squadron. He saw the potential of the Tallboy, and two of his squadrons were equipped to use the giant bomb when in August 1944 his group was ordered to sink the *Tirpitz*.

The flight path took them north over Lossiemouth, where the Liberators stopped to refuel, then on past Orkney and Shetland. Only one Lancaster had to turn back due to engine failure. From there they headed west over central Norway and Sweden, the Gulf of Bothnia and then Finland, before crossing into the Soviet Union west of Lake Onega. Before leaving, the crews had been assured that the weather would be favourable and visibility good. Instead, they found the whole region of endless forest, lake and swamp blanketed in thick low cloud, low mist and lashed by heavy rain. Most had been given the wrong radio frequencies too, so the crews had to navigate using outdated maps and dead reckoning. Consequently, only 23 Lancasters made it to Yagodnik. The other 14 Lancasters either landed on secondary

airfields in the Archangel region or were forced to crash-land in the rare patches of boggy meadow they found.

The next day, Tait set out in an old Soviet biplane to look for the stragglers, while others flew on to Yagodnik after refuelling. He found five at Keg-Ostrov beside Archangel, and more at nearby Talagi, but others were as far away as Onega, 70 miles to the east. By the end of 12 September, 31 Lancasters had been gathered at Yagodnik. Six others – four from 9 Squadron and two from 617 Squadron – had to be written off due to damage. At least these would provide spare parts for the serviceable aircraft, several of which needed urgent repairs. During all this the Soviet servicemen they encountered were extremely helpful, doing whatever they could to help Tait gather his bombers together. The ground crews worked hard through 13 September, and by the following morning a total of 27 Lancasters were ready to fly. Of these, 20 were armed with a single Tallboy while the remaining six carried a payload of JW mine-bombs. The film unit Lancaster was also fully operational. Early that morning the PRU Mosquito inspected the Kaafjord, but reported that the area was covered in low cloud: the 0800hrs take-off was postponed for a day.

The day was spent playing football and being entertained by the Russians, who produced copious amounts of vodka for the British airmen. Meanwhile, Tait revised his plans. The two squadrons would form up together, then fly east over Finland, keeping below 500ft to avoid being detected by the German radar station at Kirkenes, 70 miles north-east of Murmansk. Then, over Lapland the attackers would split into two groups. Force A, with the Tallboys, and accompanied by the film plane, would climb to 20,000ft and approach the target in four 'gaggles' of five aircraft. Three planes of the first 'gaggle', all from 9 Squadron, would fly on ahead to check out the weather conditions over the Kaafjord before the rest of the Lancasters arrived. The six JW-armed bombers of Force B would fly in at 16,000ft.

Before dawn on 15 September the Mosquito set off for the Kaafjord, and at 0900hrs DBST (0700hrs Soviet local time) it reported that conditions there were favourable. Thirty minutes later at 0930hrs DBST the Lancasters took off, and headed west over the White Sea. On the way, six of the bombers were forced to turn back due to mechanical failure, but the rest continued on towards Norway without being detected. A little before 1200hrs Tait ordered them to climb, and 40 minutes later they spotted the Altenfjord ahead of them. Tait ordered Force A to drop down to their bombing height of 14,000–18,000ft. They were also spotted themselves, and as they neared their target they could see the smoke screen spreading out over the Kaafjord. Still, at 1256hrs the first 'gaggle' from Force A were able to drop their Tallboys before the *Tirpitz* was completely obscured. One of them – possibly the one dropped from Tait's bomber – hit the battleship. The other 'gaggles' were less fortunate and, although 17 of the 20 Tallboys were dropped, could only target the source of the tracer climbing towards them. A few bombers even made more than one pass, in the vain hope that a rift would appear in the smoke screen.

Force B had a plan which should have obviated the smoke. First they circled around, to keep out of the way of Force A's bombs. Their bomb sights were targeted at a feature on the hill on the north-west side of the Kaafjord, which was above the smoke. By adjusting their sights, they hoped to ensure that the JW bombs would land around the battleship. Most of them released their bombs according to plan, dropping them from a height of 10,000–12,000ft, but none of them caused any damage. By 1307hrs the attack was over and the bombers had turned back towards Russia. The one exception was the film Lancaster, which flew on to Waddington in Lincolnshire, landing there just before 2300hrs DBST, after a flight lasting almost 13½ hours. The others flew back to Yagodnik, where the Soviets welcomed them with a marching band and more vodka. The following morning most of the jaded airmen flew home to Lincolnshire, where they expected to learn if their mission had been a success or not. One Lancaster from 617 Squadron crashed near Nesbyen in Norway on the flight home, killing all the men on board.

In fact, of all the ordnance dropped that day, only one Tallboy hit the *Tirpitz*. It landed near the bow, on the focsle beneath the guns of 'Anton' turret. It went right through the armoured deck, and continued on to pierce the starboard hull of the ship below the waterline. There it exploded, causing extensive underwater damage. One officer likened the huge hole in the focsle to 'a barn door'. There was extensive flooding forward, with 2,000 tons of water flooding the forward compartments, while internal bulkheads were buckled by the blast. One Norwegian described the hole below the waterline on her starboard side as being large enough to sail a ship's boat into. The concussion from the 'earthquake bomb' damaged the ship's engines, turbines and much of her auxiliary machinery. It was five days before a PRU Mosquito could photograph the *Tirpitz*, and this showed that her bows were down in the water, and covered by some form of screen.

To fit the 12,000lb Tallboy into a Lancaster, the bomb bay doors had to be adapted so that they bulged out to accommodate its unusually large maximum diameter of 3ft 3in for the body of the bomb, and 3ft 6in for its tail fins.

The full extent of the damage would soon be revealed through Ultra intercepts of German signals. On 19 September these reported that *Tirpitz* had been hit by a large bomb, but despite the substantial impact this had on the battleship's seaworthiness, official statements should say that *Tirpitz* only sustained light damage. At a meeting in Berlin on 25 September, presided over by Dönitz, it was estimated that it would take nine months to make the battleship seaworthy again. At that stage of the war this was far too long, so Dönitz ordered that she remain in Norway, serving as a floating gun battery to deter any coastal invasion. This meant that from that point on, *Tirpitz* was no longer considered a fully operational warship. A suitable spot had to be chosen for her, in an area worthy of being defended by her guns, but in an anchorage shallow enough that if hit, she could not be sunk. That way she could still serve as a static gun battery, even if her main decks were all but awash.

The Germans finally selected a spot in the Sørbotn Channel, off the small island of Håkøya, 3.5 miles west of Tromsø in northern Norway. At noon on 15 October, *Tirpitz* left the Kaafjord for the last time, and slowly made her way up the Altenfjord under her own steam, but aided by tugs. She could only manage 3 knots. Apart from a 25-mile stretch beyond the mouth of the Altenfjord, the route to her new anchorage ran through sheltered coastal waterways, protected from the sea by a barrier of islands. The Kriegsmarine were taking no chances, though, and as a wolfpack of U-boats patrolled offshore, a screen of destroyers and smaller craft escorted the limping battleship south towards Tromsø. By 1500hrs GMT the next day she was in place, lying off Håkøya. On 18 October she was spotted there by British reconnaissance planes. All her flak defences and smoke screen equipment

EVENTS

After being crippled while anchored in the Kaafjord in September 1944, temporary repairs were carried out, allowing *Tirpitz* to be moved 120 nautical miles further south, to a new berth near Tromsø. It was acknowledge the battleship could never put to sea again – her new role was merely to act as a floating gun battery, to deter any attempted Allied landing in the area. While she was no longer a threat to the Arctic Convoys, the British had no idea how badly damaged she was. So, the air attacks continued. In late October the RAF carried out another major attack using Avro Lancasters, converted to carry the Tallboy bomb. Although this sortie – Operation *Obviate* – was foiled by low cloud obscuring the target, the two Lancaster squadrons earmarked for the operation were ordered to have another go. The result was Operation *Catechism*, and this time the skies over Tromsø remained clear. Even more surprisingly, the Luftwaffe failed to intercept the bombers. So, for the third time in three months, *Tirpitz* was attacked using Tallboys. This time her luck ran out. She was hit by at least three bombs, and mortally wounded. After 30 minutes she capsized and sank, taking almost 1,000 men down with her.

Operation *Obviate* (29 October 1944)

Cloud cover 8/10ths, 6,000ft. Visibility: Good. Bombing height: 14,000 feet

1. 7.49am The 20 Lancasters of 617 Sqn commence their attack, dropping Tallboy bombs from heights ranging from 13,000–15,000ft. Target almost completely obscured by clouds. No aircraft lost, but no bombs hit their target.
2. 7.55am The 17 Lancasters of 9 Sqn commence their attack, but again, visibility through clouds is poor, and three bombers failed to release their bombs, as their crews were unable to see the target. No aircraft lost, but four hit by flak. No bombs hit their target.
3. 8.05am The strike leader Group Captain Tait circles the area, watching the attack. Some bombers make more than one attempt due to poor visibility through cloud, circling round and following the same attack profile. Eventually, Tait orders the aircraft to withdraw.

Operation *Catechism* (12 November 1944)

Cloud cover 3/10ths, 18–20,000 feet. Visibility: Good Bombing height: 14,000ft

4. 9.42am the first wave of six Lancasters of 617 Sqn. released their Tallboy bombs from between 12,500 and 15,000 feet. After this, as his leading aircraft withdrew, Group Captain Tait circled round to watch the subsequent waves of bombers make their run. All 18 Lancasters of 617 Sqn. released their bombs in the space of three minutes, between 9.42 and 9.45am.
5. Just after 9.45am the first of ten Lancasters of 9 Sqn. released their bombs. The squadron's attack continued until 9.49am, by which time it was clear the Tirpitz was listing heavily. The final three Lancasters of the squadron elected to save their bombs, as their mission had been accomplished.
6. Apart from two, all the bombers in the strike crossed over the ship, and banked to port, to cross over Kvaloy island. from there they headed out towards the open sea. the two exceptions were Tait's Lancaster, which circled the area throughout the attack, and the photographic Lancaster, which also circled the target.
7. The *Tirpitz* had been hit by at least two Tallboy bombs, causing major damage to her. She began listing, and at approximately 10.04am a major explosion ripped through the bow of the battleship, as a magazine exploded. She then began to capsize, until only her upturned hull could be seen above the water.

Operations *Obviate* and *Catechism*
Off Tromsø, October–November 1944
KEY
AA guns
3
6
KRIEGSMARINE SHIPS
A. *Tirpitz*
B. *Nymphe* AA ship
C. *Thetis* AA ship
Håkøya
Kvaløya
A
B
C
7
RAF Units
1. Operations *Obviate*: 37 Lancasters of 617 Sqn and 9 Sqn, in waves of 4–6 aircraft at 13–15,000ft
2. Operation *Catechism*: 38 Lancasters of 617 Sqn and 9 Sqn, in waves of 4–6 aircraft at 13–15,000ft
Sandnessundet
5
4

Tirpitz, photographed in her final mooring place off Haakøy Island near Tromsø. In this photograph, taken in early November 1944 by a PRU plane, the battleship can be seen lying close to the south-east corner of the island, surrounded by torpedo nets. In the distance, to the north, lies one of the two flak ships assigned to protect the battleship. The second was anchored just off the bottom right of the photograph.

were still being dismantled and shipped south. Until they arrived, the battleship lay largely unprotected, apart from her own guns, and those of two flak ships moored nearby. Bomber Command was aware of this too. It had a unique 'window of opportunity' to bomb the *Tirpitz* before her defences were strengthened. So, orders were issued to 5 Wing that the two Lancaster squadrons would have another go.

Operation *Obviate*

For Bomber Command, the advantage of Tromsø over the Altenfjord was that it lay 200 miles closer to Britain, and in theory just within flying range of a Lancaster flying from an air base in north-east Scotland. The added weight of a 12,000lb Tallboy decreased this range slightly; it also got in the way of the necessary extra fuel tanks, until someone thought of using one of the long thin ones from a Wellington bomber, which could sit inside the fuselage on either side of the bomb bay. This was augmented by a drop tank from a Mosquito. Altogether these held another 300 gallons of fuel, giving a total of 2,406 gallons – just enough to see the bombers to Tromsø and back again.

However, this extra fuel meant that with their payload of one Tallboy apiece, the bombers were now 2 tons overweight. In the Lancasters of 9 and 617 Squadrons, the upper turret had already been removed for Operation *Paravane*. Rather than strip out another turret, the ground crew removed the armour protecting the underside of the cockpit. To provide additional power, all of the older bombers were fitted with Merlin T24 engines. Now, theoretically at least, the bombers could reach their target.

Planning was difficult, as these two squadrons based in Lincolnshire were on stand-by for urgent specialist missions over Germany, if requested by Supreme Allied Headquarters. The other factor was the weather over Tromsø, which by October was turning fickle again, foreshadowing the return of the long Arctic winter. However, by late October the long-term

forecast suggested clear skies over the target area. So on 28 October the two squadrons were ordered north from Barney and Woodhall Spa, to Lossiemouth and Kinloss, two of the forward airfields used in the bombing raids on *Tirpitz* during 1942. In addition the smaller airfield of Milltown near Elgin was used to house the visiting bombers and their ground staff. In all, 36 Lancasters were scheduled to take part in the mission, 18 from each squadron.

That evening the crews underwent their final briefing. This mission, codenamed Operation *Obviate*, would involve the two squadrons flying north along the now familiar route past Orkney and Shetland, before heading north-west towards the Norwegian coast at a low altitude, making landfall well south of Tromsø. That was where intelligence had found a gap in the German radar chain between Bodø and Trondheim. There the bombers would form up for the attack over a lake in the mountains, then head north-west to reach the target. It was thought that the high ground would help screen their approach. Ideally, the battleship would be bombed from a height of 13,500ft. The bombers of 617 Squadron would lead the attack, flying in column, followed by 9 Squadron. At midnight on the evening of 28 October, a PRU Mosquito flew over Tromsø and reported that conditions were favourable. Between 0103 and 0255hrs GMT the bombers took off. Once again they were accompanied by a film unit carried in a Lancaster from 463 Squadron. Their strength was augmented by three extra bombers, two from 9 Squadron and one from 316 Squadron, so a total of 40 Lancasters flew on the raid, including the film unit aircraft.

This approach flight went smoothly, the aircraft flying at 1,500ft for most of the journey. They crossed the coast without interference and began climbing to 10,000ft. At that point one bomber from 9 Squadron was forced to turn back due to engine problems. The rest assembled over Lake Torneträsk, just over the border in Sweden and 100 miles south of Tromsø. As the bombers approached the target area Tait ordered them to form into a column, flying at 14,000ft. They came out of the mountains near the head of the long Balsfjord which led north-west towards Tromsø. That way they would be approaching the target from an unexpected angle. So far the weather had been good, and the sky clear. This, though, was about to change. At 0750hrs GMT, just as the target came into view, the airmen noticed that the wind had veered, and was now coming from the west. The line of low cloud over the coast began creeping towards Tromsø, and by the time the first bombers reached the target at 0759hrs the *Tirpitz* was completely obscured. A minute earlier and she would have been fully visible.

The flak proved intense, as although only half of the guns from the Kaafjord had been set up in their new locations, Tromsø itself had its own flak batteries. *Tirpitz* joined in too, as did the two flak ships moored to the east and north-east of her. The attack went ahead anyway, even though the bombers had nothing to aim at through the impenetrable layer of low cloud. A total of 32 bombers released their Tallboys, even if many of the pilots circled round for a second or even a third run. One bomber from 617 Squadron was hit, and forced to limp off towards Sweden. Four retained their bombs due to a lack of a target, and two others failed to reach the target area in time. Three Lancasters were hit by flak, but escaped any significant damage, and Tait led the bombers back home. All of them returned safely, but a mood of bitter disappointment hung over the crews, who had flown so far, only to be thwarted at the last minute.

All of the bombs missed the *Tirpitz*, but one near miss landed 50 yards from her stern, the blast buckling her port propeller shaft. Despite Tait's plan the Germans had been forewarned of the bombers' approach as they passed over the coast, so the air raid warning was sounded in Tromsø and on board *Tirpitz*. While the flak gunners had done well, their fire augmented by the ship's 38cm and 15cm guns, any boost to morale was countered by the realization that they hadn't managed to break up the bomber formation before it attacked. Few of the German sailors were in any doubt that the bombers would return. The planners of Bomber Command were less certain. It was now almost November, and daylight was a rare commodity beyond the Arctic Circle. Still, as the two squadrons flew back to their home airfields, the PRU flights continued, as did the stream of meteorological reports. The next

In this photograph, taken during the opening moments of Operation *Catechism*, *Tirpitz* has received an initial hit amidships, and smoke is pouring from her superstructure. This was taken at around 0843hrs, from the 617 Squadron Lancaster flown by Flight Lieutenant Knights.

time conditions were favourable – really favourable this time – the bombers would be sent back to finish the job.

Operation *Catechism*

On 4 November, Captain Junge stood down as commander of *Tirpitz* and was sent to the Kriegsmarine's headquarters in Norway. His place was taken by his second-in-command, Captain Robert Weber, a gunnery specialist. By then dredgers were at work to reduce the depth of water under the battleship's keel, the smoke generators had arrived and were beginning to be installed, new flak guns were being emplaced, the torpedo nets had been laid and a direct phone link had been established to the Luftwaffe, so air support might actually arrive for once. Weber was confident that within three weeks the days would be so short that his battleship would be relatively safe from enemy air attack until the following spring. Until then, though, he needed low cloud and bad weather.

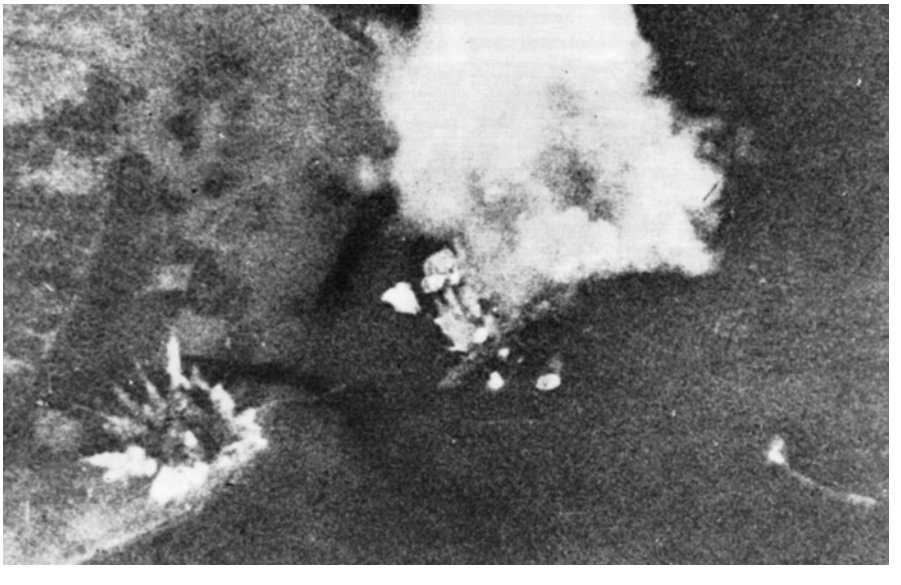
Bomber Command's 5 Group planners were conversely keen for a spell of clear and cloudless skies. The mere prospect of just such a spell was enough for 9 and 617 Squadrons to be ordered north again on 4 November, just in case these conditions might actually be met. Instead, northern Norway was swept by a winter gale. Then, on 11 November, the bombers were recalled to Scotland, as meteorological reports suggested that a spell of good weather was expected over Tromsø, which might last for up to two days. A Spitfire was dispatched to T**r**omsø, and reported that there were cloud patches over the target area. Although there were no guarantees, and this seemed far from favourable, the mission, now codenamed Operation *Catechism*, was confirmed. The crews were given a final briefing, and tried to rest before their departure early the following morning. The plan was largely the same as for Operation *Obviate*. The only difference was that a new intelligence report said that a squadron of German fighters had recently arrived at Bardufloss airfield, 42 miles south of Tromsø and almost astride the bombers' approach path to the target.

At 0259hrs GMT on 12 November the first of 32 bombers took off from Lossiemouth, Kinross and Milltown, the 13 operational bombers of 9 Squadron and 18 more from 617 Squadron accompanied once again by the Lancaster from 463 Squadron carrying the film unit. Once more they flew across the North Sea at 1,500ft, flying north, then veering towards Norway once they reached Shetland. The Norwegian coast was reached without incident, and the aircraft, widely separated in the darkness, now headed for their rendezvous point over Lake Torneträsk. Tait, who commanded the mission, was one of the first to arrive, and as he circled he saw other bombers straggling in. When all but two of 9 Squadron's bombers had appeared, Tait fired a flare pistol to signal that they should move off towards the target (the two stragglers returned to Britain after realizing they had missed the rendezvous). The sun was just beginning to rise over on the eastern horizon, but as they continued the light improved, until as one airman described it, the air was 'gin clear'. This could only be good for the bombing run, but the air crew also knew it would benefit the pilots of any German fighters scrambling from Bardufloss.

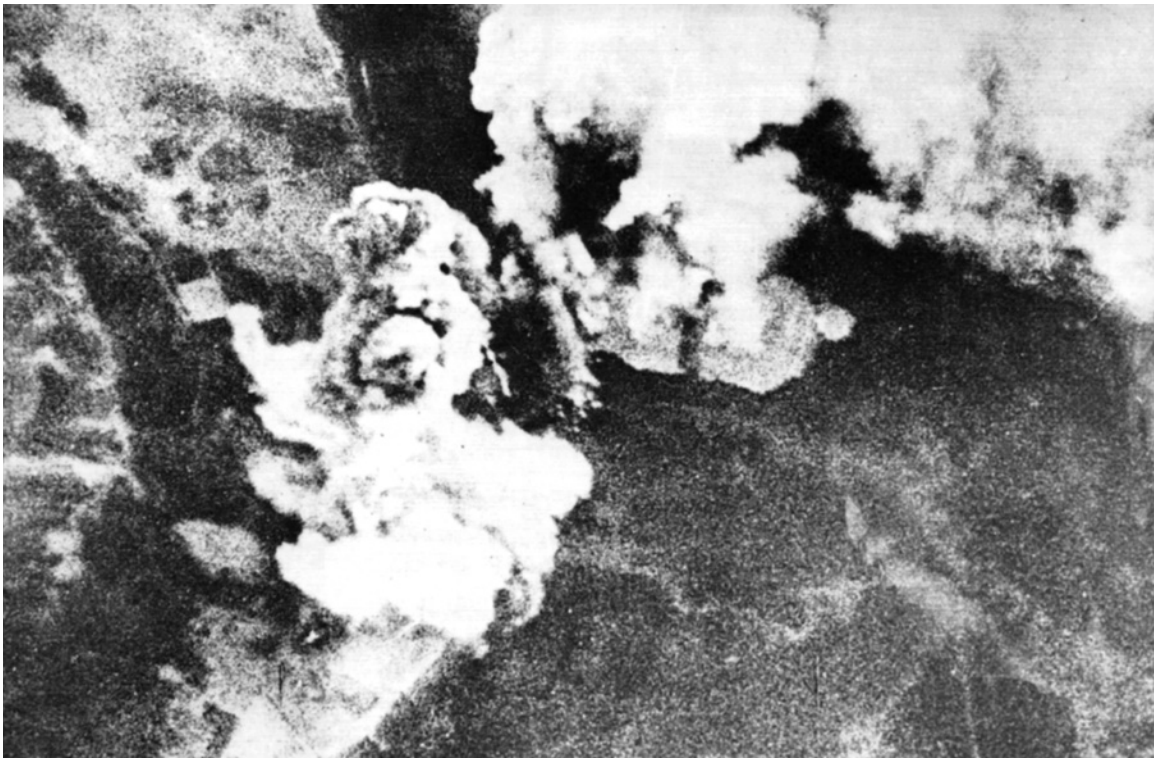
They climbed steadily to their prearranged bombing height of around 14,000–15,000ft, flying in 'gaggles' of four to six bombers, with 617 Squadron leading the column and 9 Squadron following behind. Tait's Lancaster was at the front. They spotted the Balsfjord, and banked to port to follow it towards the *Tirpitz*. They spotted the battleship 20 miles ahead of them, and this time there was no cloud to protect her – or a smoke screen. She appeared black, in contrast with the white snow-clad islands and coast around her. Tait felt she looked like a 'spider in her web', surrounded by her torpedo nets. The target might have been unprotected by smoke, but there was plenty of flak, including big orange air bursts from the battleship's 38cm main guns. The bomber crews held their nerve, and their course, although the flak intensified as they drew closer to their target.

It took five minutes to reach the bombing point after first spotting the target, and Tait noticed how the battleship lay with her bows pointing towards the north-east, so she was almost beam-on to the approaching bombers. The south-eastern side of the island of Haakøy lay about 400 yards off her port beam, while the side of the ship itself twinkled with flame as her flak guns fired at the approaching bombers. Her main gun turrets were trained to starboard, but the bombers were now too close for the big guns to bear on the attackers. Then they were approaching Grindøy Island, and the release point for the Tallboys.

The 18 Lancasters of 617 Squadron approached the target in 'gaggles' of from four to six bombers, flying at a range of heights from 12,650 to 16,000ft. This meant that some



This photograph of the *Tirpitz* was taken from 13,400ft during Operation *Catechism* at around 0844hrs on 15 November, from the Lancaster of 617 Squadron flown by Flight Lieutenant Knights. It shows the battleship belching smoke and flame, while a Tallboy explodes on the nearby island of Haakøy.



In this photograph, taken from around 16,000ft at 0849hrs during Operation *Catechism*, from the Lancaster carrying the film crew, the *Tirpitz* is completely obscured by smoke, as a large explosion erupts from her stern. This was the moment when 'Caesar' turret was blown out of the dying ship.

bombers were flying lower than their prearranged bombing height, in accordance with the 'gaggle' tactic of varying heights to make the approaching group of aircraft harder for flak batteries to target. Then at 0941hrs GMT the automatic bomb release mechanism triggered on Tait's plane, and his Tallboy began its descent. It took roughly 30 seconds to reach its target, and as Tait and his crew flew over the battleship, banking to port, they saw it head towards it. Other bombers reported that it had hit. By then the rest of the squadron were releasing their bombs too, and *Tirpitz* was now hidden in a pall of smoke, flame and spray from near misses. The film crew were busy recording all this, and their footage shows a big mushroom cloud appear near the bow of *Tirpitz*, probably from Tait's Tallboy. Other bombs can be seen to fall, then at 0943hrs another big hit amidships enveloped the ship in smoke.

Behind 617 Squadron, the 11 bombers of 9 Squadron added their contribution to the scene of destruction, with the first of their bombs falling at 0945hrs. By now the smoke was making it hard to see the target, so a few of the pilots went round for another run. The film plane was circling too, as was that of Tait, who was watching his aircraft finish the job he started. Then, at 0949hrs, it was over. The last of 9 Squadron's bombs had been released, and at least one major hit had been scored by the squadron. The smoke surrounding *Tirpitz* made it difficult to assess the damage. However, as the bombers departed, the battleship was clearly listing to port, and at 0949hrs a big explosion was seen, followed by at least one smaller one two minutes later. Tait led his Lancasters away towards the south-west, and the open sea. Only the film unit bomber remained, her crew disappointed that the battleship was still afloat. Then, as they watched, she heeled over to port, and then capsized. Soon only the red of her upturned hull was showing above the water of the fjord. The beast had finally been slain.

On board *Tirpitz* Captain Weber had plenty of warning of the approaching bombers, and his gun crews were ready for them. However, despite the increasingly frantic calls to Bardufloss, no air cover appeared. The Luftwaffe later blamed a 'clerical error' for this. So,

apart from the shore-based flak guns, the *Tirpitz* was on her own. At 0802hrs local time (0902hrs GMT) 'Action Stations' was sounded, and at 0838hrs *Tirpitz* opened fire. None of the bombers were hit, and at 0841hrs local time (0941hrs GMT) the crewmen manning their stations on the upper deck watched as the first of a series of huge bombs fell towards them.

The first bomb landed forward, on the port side behind the funnel, astride the aircraft catapult deck. Another landed a little further aft, also on the port side. Both bombs ripped through the battleship's armoured deck and exploded inside her, causing extensive fire and flooding. *Tirpitz* began listing to port, but what really finished her was the near misses. Several bombs landed next to her in the water, and while their blasts caused underwater damage and flooding, they also blew huge craters in the seabed beneath her. Weber ordered his crew to deal with the flooding, and to evacuate the armoured citadel, but it was too late.

The ship was already listing 15 degrees, and the angle was increasing. Weber expected the ship to settle on the seabed, just a few metres below her keel, not knowing that the mud and sand beneath the keel had literally been blown away. Then at 0850hrs local time (0950hrs GMT) a huge explosion in the magazine for 'Caesar' turret ripped through the stern of the ship, and blew the 700-ton gun turret out of the ship. Moments later the list became more pronounced, until the battleship was lying on her side. At that point Weber gave the order to abandon ship. For most of his crew the order came too late. More, smaller explosions followed, and the heeling continued, until most of the superstructure was submerged. She hung there for a few moments, then rolled over completely.

Inside the hull, thousands of men were trapped, bulkheads collapsed, escape routes became jammed, the lights went out, and most of the young men inside the battleship's hull either died in the dark, or struggled to survive, kept alive by the slim hope that they might somehow be rescued. Very few were. Of the 1,700-strong crew of the *Tirpitz*, almost 1,000 were trapped inside her, or were killed at their posts. Of these, only 84 were ever rescued, escaping through holes cut in her hull during the days that followed. Meanwhile, all of the bombers returned safely.

Operation *Catechism*, Tromsø, 12 November 1944

After the damage suffered on 15 September 1944 during Operation *Paravane*, the *Tirpitz* was no longer considered combat effective. So, unable to undertake any more sorties, she was relegated to the role of a floating coastal defence battery, and moored in a new berth off Haakøy Island near Tromsø. It was there on 29 October that she was attacked by Lancaster heavy bombers of 9 and 617 Squadrons, flying from bases in the north-east of Scotland. On that occasion low clouds foiled the mission, codenamed Operation *Obviate*. Undeterred, Bomber Command waited for a more suitable opportunity. It finally came two weeks later on 12 November. The same two squadrons were involved in this mission, codenamed Operation *Catechism*, and this force of 30 Lancasters was led by Wing Commander Tait, the commanding officer of 617 'Dambusters' Squadron.

Flying conditions over northern Norway were perfect, and the *Tirpitz* was spotted while she was still 20 miles away. The bombers approached the target from the south-east, flying in 'gaggles' – groups of four to six bombers, operating in a loose formation, and at varying heights, to make it harder for flak gunners to target them. Tait and 617 Squadron led the way, followed by 9 Squadron – a force of 29 bombers in all, each armed with a single 12,000lb Tallboy bomb, and a 30th Lancaster, there to film the operation.

The attack began at 0841hrs, and the first Tallboy hit the battleship 30 seconds later. Soon she was half-hidden by a plume of smoke and flame, as numerous other bombs either hit her, or landed close by her in the water, causing underwater damage to her hull. The attack lasted just eight minutes, and by its end it was clear that the battleship was finished. She was listing heavily to port, and then as the bombers departed the first of two more explosions wracked the ship. As the lingering film crew watched, *Tirpitz* slowly rolled over and capsized, so that only her upturned hull could be seen above the water. This plate shows the aircraft of 617 Squadron flying over Haakøy Island after completing their bombing run, while behind them the Lancasters of 9 Squadron are dropping their Tallboys on the target. One 12,000lb bomb has hit the shore of the island – a detonation that left a crater which can still be seen there today – while others are falling around the battleship itself, which by now is in her death throes.

Jim Laurier

AFTERMATH AND ANALYSIS

Wing Commander J. B. Tait (fifth from left), commanding 617 Squadron, and the crew of his Lancaster KC-D, pictured on 17 September 1944 at their squadron's home airfield at Woodhall Spa in Lincolnshire. This was the day after their return there from northern Russia following Operation *Paravane*.

When the *Tirpitz* arrived in Norway, her mission was to interdict the Arctic Convoys. Within seven weeks she conducted her first sortie against them – and her penultimate one. Effectively, what consigned her to another role was Hitler's unwillingness to risk the loss of another capital ship. So, while the campaign against the Arctic Convoys was being waged by the Luftwaffe and the U-boat arm, the *Tirpitz* remained at her moorings. By necessity, therefore, Grand Admiral Raeder assigned another role to her – that of 'a fleet in being'. Although this was a passive objective, it was also a low risk one. For the next two years the *Tirpitz's* principal function was to tie down the capital ships of the British Home Fleet. She made only one more operational sortie, against the ill-fated Convoy PQ-17, and even then the mission was aborted, as it involved a modicum of risk to the German surface task force involved.

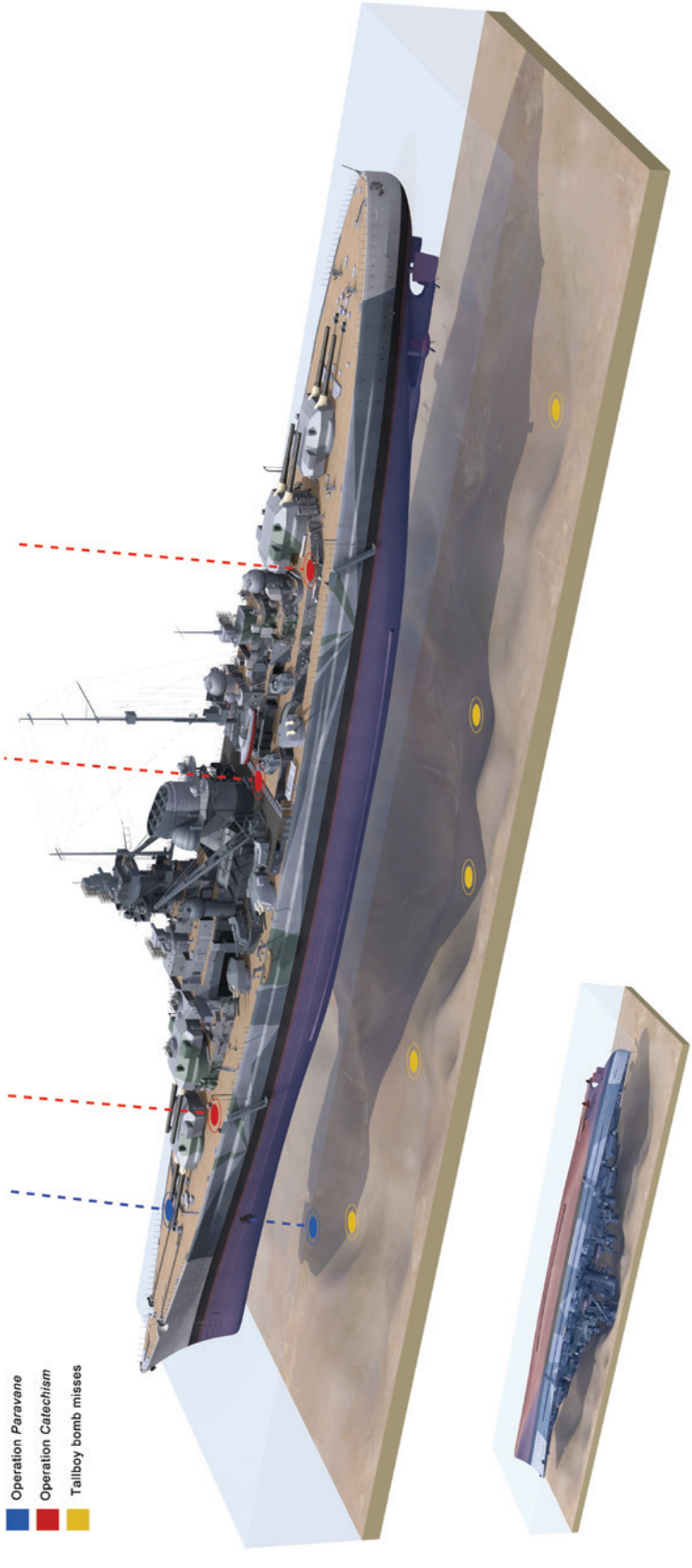
Effectively, this 'fleet in being' role was nullified in September 1943, when two British X-craft succeeding in damaging her so significantly that it took several months before she could be considered operational again. Even then she never retained her original degree of combat readiness; damage to her propulsion system saw to that. Her return to Germany for repairs was operationally impossible, as she would never have been able to run the gauntlet of Allied naval and air attacks. So, she remained in Norway. However, she was now too slow to undertake a sortie without running a major risk of being overhauled by superior Allied forces. All she had left was her reduced ability to pose a latent threat. This ability was degraded even further by Operation *Tungsten*. It can be argued that after the spring of 1944, any threat she posed had evaporated. This was certainly reflected in a gradual paring down of the Home Fleet that year, as a number of capital ships were sent to the Far East.

However, by then, the idea that the *Tirpitz* remained a threat was so ingrained that the virtual impossibility of her taking offensive action was no longer a consideration. The British goal now was her destruction. From the documentary evidence, it was clear that much of this obsession emanated from the British War Cabinet, and in particular from Churchill.

Two German servicemen examine the port propeller bracket of *Tirpitz*, following her destruction off Haakøy Island. In front of them a hole has been cut through her lower hull plates, one of several made in an attempt to rescue survivors trapped inside the capsized battleship.

The war was now as good as won, and while the Arctic Convoys continued, their losses gradually diminished as German bomber and U-boat losses in the theatre mounted. So, by the summer of 1944 *Tirpitz* had largely become irrelevant. Nevertheless, it was Churchill who ordered Bomber Command to 'finish the job'.

This they did during the autumn of 1944, in three well-planned and executed bombing missions. In *Paravane*, they damaged *Tirpitz* sufficiently that she could no longer function without tugs to guide her. Now, without any doubt, she could no longer fulfil her Mahanian role. Instead, she was reduced to the status of a floating gun battery, guarding a port which the Allies never planned to attack. Then came *Obviate* and *Catechism*, two bombing missions whose main goal was to deliver a propaganda victory for the British. A film unit even accompanied the attacks, in its own plane. So, in November 1944, when *Tirpitz* finally capsized and sank, the once-mighty battleship had become an irrelevance. Her sinking did nothing to shorten the war, but it provided the British public with some welcome news, and provided a neat ending to what had been a long and often tortuous aerial campaign.


Operation *Paravane*
Operation *Catechism*
Tallboy bomb misses

OPPOSITE TALLBOY HITS ON *TIRPITZ*

It can be argued that the fate of *Tirpitz* was sealed during Operation *Paravane* (15 September 1944), when a 12,000lb deep penetration 'Tallboy' struck the forecastle of the battleship, plunging through her decks to pass through the lower port side of her hull below the waterline. This caused heavy flooding and underwater damage to the ship, and reduced the trim of her bow by approximately 15ft. As a result of this hit, and the accumulated damage incurred during earlier attacks, the Kriegsmarine officially decided that *Tirpitz* had 'ceased to be a fighting unit'.

During Operation *Obviate* (29 October 1944) only one near miss from a Tallboy damaged the battleship. It fell some way from her stern (outside the area shown in this diagram), but the pressure waves caused damage to the battleship's port propeller shaft. This, however, was insignificant compared to the cumulative effect of several near misses by similar bombs two weeks later.

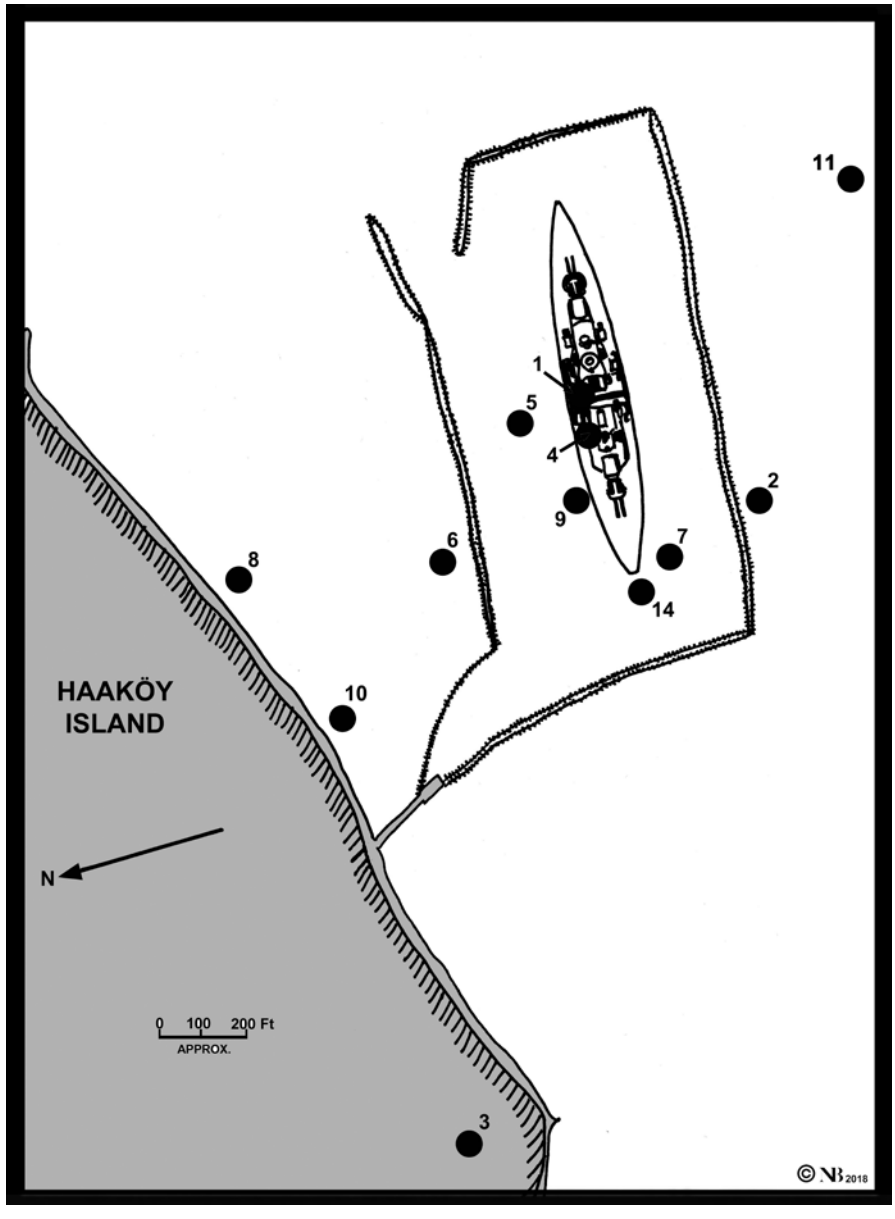
During Operation *Catechism*, *Tirpitz* was struck by three Tallboy bombs. The first landed on her catapult deck, and the second further aft, close to 'Caesar' turret. Both bombs penetrated *Tirpitz*'s armoured deck, and exploded deep inside the ship. It is also possible that the ship was struck by a third bomb, as shown here, which reputedly struck her on the port side, just behind 'Anton' turret. However, it failed to explode. All of these hits caused extensive internal damage and flooding, but it was the second that had the greatest impact, causing a fire that ignited a magazine beneath 'Caesar' turret, which caused an explosion devastating enough to blow the turret out of the ship. The flooding had caused the battleship to list to port, but this internal explosion aggravated the list, causing the ship to roll onto its beam.

The effect of the several near misses off the port side of the ship was to accentuate this underwater damage to her hull, and so hasten her flooding, but also to excavate the seabed beneath her. These were 'earthquake bombs', designed to create seismic disturbance, and to cause the earth around the target to be displaced, resulting in a camouflet, or crater. In the case of *Tirpitz* this effectively scoured the seabed beneath her, so that when the battleship rolled over she continued to do so until the vessel was completely inverted.

As for the air attacks themselves, the various operations by both the Fleet Air Arm and Bomber Command provided a number of salutary lessons. For the Royal Navy, the Albacore attack in March 1942 was no different from numerous other similar attacks of the war. It was pressed home with determination, and with a little more luck it might have achieved something other than the death of six airmen. What it did expose, though, was the risks involved in attacking modern warships with slow and obsolete aircraft. The Fleet Air Arm was plagued by poor aircraft design for much of the war, and this merely demonstrated that the 'Applecore' was just another of those poorly performing aircraft.

The situation had improved slightly by the spring of 1944. By then, slightly better British designs such as the Barracuda formed the backbone of the naval strike wings, but even these planes were too slow to do their job effectively. Better results were had from the American-designed fighters which accompanied the strike wings. In fact, their bombing and strafing runs during *Tungsten* proved to be a real highlight of the Fleet Air Arm's summer offensive. However, the real limitation of these large-scale air operations was that for the most part the air crews who took part in them were inexperienced, as by then the more experienced air crews were serving elsewhere – the airmen on board *Victorious*, for instance, were already operating in the Far East by the time *Goodwood* began.

This lack of experience might have been partly overcome if the Navy had been able to devote more time to training for this specialist mission – a few days of 'dry run' attacks over a Scottish sea loch were not enough. As a result, the crews were thwarted by the smoke screen they encountered in the Kaafjord. Essentially, the Barracudas were too slow to reach the *Tirpitz* before she was obscured, which meant that the accuracy of their bombing was poor. The Navy knew of the problems posed by these smoke screen defences, but failed to develop bombing techniques which might have improved the performance of the strike wings. One solution, suggested later, was for fast-flying fighters to drop flares over the ship, before the screen obscured her. Then at least the



In this diagram, based on information gathered by Bomber Command after Operation *Catechism*, the location of the Tallboy hits on *Tirpitz*, and many of the near misses, have been recorded, along with the order in which the bombs fell. Also shown are the location of the torpedo nets surrounding the battleship.
(Map by Nick Buxey)

bombers might have a viable aiming point. Still, with insufficient problem-solving, hasty preparation, inadequately trained crews and low-performance aircraft, it is a real achievement that these strikes achieved what they did – a significant degradation of the German battleship's ability to function.

As for Bomber Command's attacks, the spring raids of 1942 proved costly, largely because the bomber crews, however well they had been briefed, were unprepared for the problems they encountered over the Faettenfjord. This was the first demonstration of the effectiveness of the battleship's smoke screen, and it foiled every attack. The bomber aimers had to fall back on dead reckoning – no easy matter while flying at speed up a high-sided fjord, through a wall of smoke. The intense flak took some of the air crews by surprise too. Its intensity is reflected in the relatively high losses encountered by the bomber crews during these attacks – roughly 12 per cent of the airmen who took part were either killed or captured. At least

these attacks allowed the planners of Bomber Command's 5 Group something to evaluate, before attempting similar attacks again.

The real problem plaguing the British, however, was a lack of suitable ordnance. The 1,600lb AP bombs and 2,000lb 'cookies' used by the Fleet Air Arm and RAF respectively were powerful enough to inflict damage, especially the naval weapon. Unfortunately, this weapon was let down by manufacturing problems. If it had proved more reliable, and if the Barracuda crews had been able to score more hits, and in the right places, the *Tirpitz* might well have been destroyed six months earlier. However, it was not to be. So it was not until the summer of 1944, and the introduction of the Tallboy, that the British finally had the ordnance they needed to sink the German battleship. This took all the variables of luck and skill out of the equation. With it, even a few near misses could achieve a similar result to a direct hit or two.

In some ways these final operations – *Obviate* and *Catechism* – were something of an anti-climax. By then the *Tirpitz* was so badly damaged that she was no longer a threat to the Arctic Convoys, and with the Allies advancing on Germany from both east and west, the outcome of the war was no longer in doubt. However, what *Catechism* did achieve, apart from the final climactic destruction of the *Tirpitz*, was that it marked the passing of an era. It proved that even a powerful modern battleship was now no match for a bomber that carried the right ordnance. Although the writing had been on the wall for the battleship since 1916, this air campaign demonstrated that it was now a dinosaur on the eve of extinction. Airpower, both land-based and carrier-based, was the real arbiter of victory in the war at sea. The upturned hull of the *Tirpitz*, quietly rusting in a Norwegian fjord, now served as a fitting gravestone for that bygone era.

After the war, a Norwegian salvage company bought the *Tirpitz*, and set about salvaging what they could of her. Up to 1,000 bodies were interred in the battleship, and where possible their remains were recovered as the salvors worked their way through the ship.

FURTHER READING

Bekker, Cajus, *Hitler's Naval War*, London (1974)

Bishop, Patrick, *Target Tirpitz: The Epic Quest to Destroy Hitler's Mightiest Warship*, London (2012)

Campbell, John, *Naval Weapons of World War Two*, London (1985)

Chesneau, Roger, *Aircraft Carriers of the World, 1914 to the Present: An Illustrated Encyclopaedia*, London (1992)

Cooper, Alan W., *Beyond the Dams to the Tirpitz: The Later Operations of 617 Squadron*, London (1983)

Drucker, Graham Roy, *Wings over the Waves: Fleet Air Arm Strike Leader against Tirpitz*, Barnsley (2010)

Forsgren, Jan, *Sinking the Beast: The RAF 1944 Lancaster Raids against Tirpitz*, London (2014)

Gardiner, Robert (ed.), *Conway's All the World's Fighting Ships, 1922–1946*, London (1980)

Grove, Eric, *Sea Battles in Close-Up: World War 2*, Vol. 2, Shepperton (1993)

Iveson, Tony and Milton, Brian, *The Lancaster and the Tirpitz*, London (2014)

Kennedy, Ludovic, *Menace: the Life and Death of the Tirpitz*, London (1979)

Llewellyn-Jones, Malcolm (ed.), *The Royal Navy and the Arctic Convoys: A Naval Staff History*, Abingdon (2007)

Mallmann Showell, Jak P., *Hitler's Navy: A Reference Guide to the Kriegsmarine, 1935–1945*, Barnsley (2009)

Peillard, Léonce, *Sink the Tirpitz!*, London (1983)

Roskill, S.P., *The War at Sea, 1939–45*, vols II and III, London (1954)

Smith, Nigel, *Tirpitz: The Halifax Raids*, Walton-on-Thames (2003)

Sweetman, John, *Tirpitz: Hunting the Beast: Air Attacks on the German Battleship, 1940–44*, Stroud (2000)

Walling, Michael G., *Forgotten Sacrifice: The Arctic Convoys of World War II*, Oxford (2012)

Whitley, M.J., *Battleships of World War Two: An International Encyclopaedia*, London (1998)

Woodward, David, *The Tirpitz*, London (1953)

Zetterling, Niklas and Tamelander, Michael, *Tirpitz: The Life and Death of Germany's Last Super Battleship*, Newbury (2009)

A young German sailor peering upwards through a series of holes cut in the internal steel bulkheads of *Tirpitz*. Rescuers had to work their way into the ship from the upturned hull. For most of her crew, though, the rescuers were too late.

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A Question of Time
During World War II, the United Kingdom used Greenwich Mean Time (GMT) in winter, and Double British Summer Time (DBST) in summer. The latter replaced British Summer time (BST) from 1941 until 1945. In winter, GMT was also advanced an hour during the war, so that it was effectively GMT+1, the same as BST. DBST was two hours ahead of peacetime GMT, making it GMT+2. These changes were introduced so that that the United Kingdom was on a similar time zone to the mainland of Continental Europe. However, DBST was not implemented on a regular basis. Rather its use varied due to what the government termed 'strategic necessity'. During the period covered in this book, DBST was in effect from; 5 April to 9 August 1942, 4 May to 15 August 1943, and 8 August to 17 September 1944. So, for the sake of convenience, all timings given in this book are given using the UK system, with DBST used during the date ranges just mentioned, and GMT (or rather peacetime GMT+1, or BST) for all other periods. In the rare instances where German or Norwegian timings are at variance, they are described as being in local time, while the equivalent time in GMT is also listed.
Confusingly though, during the Fleet Air Arm attacks on *Tirpitz* during the spring and summer of 1944, DBST was used throughout these operations, to bring air operations into line with Norwegian time, which had been altered by the Germans to correspond with the time zones being used in parts of Eastern Europe. So, for these operations DBST is used.

Photographs
All photographs and line maps are courtesy of the Stratford Archive.

Title page photograph:
Aboard the escort carrier *Empress* on 3 April 1944, the Fleet Air Arm Hellcat pilots of 800 and 804 Squadrons study a relief map of the Kaafjord, in a last-minute briefing before the start of Operation *Tungsten*. Two hours later the first of their attack waves would be strafing the decks of the *Tirpitz*.